US EPA RECORDS CENTER REGION 5

1010277

Date Dec 28, 1992

SUPPLEMENT TO OCTOBER 12, 1992 RFI WORK PLAN: Installation of Additional Monitoring Wells and Sampling, RCRA Facility Investigation (RFI) Former Amphenol Facility, Franklin, Indiana

# SOP FOR OFF-SITE GEOPROBE GROUND WATER SAMPLING FOR CLP ANALYSIS FOR THE FORMER AMPHENOL SITE RFI

#### METHOD DESCRIPTION

In order to avoid placing permanent monitoring wells off-site in the Franklin City right-of-way, ground water samples from the Unit B saturated sand will be recovered through a hollow Geoprobe sampling train inserted to sampling depth by a truck-mounted hydraulic ram. Samples will be analyzed by the CLP contract laboratory for volatile organic compounds, total metals and total and amenable cyanide as described in the project QAPP approved May 25, 1991. Sample locations and ground elevations will be established by a surveyor and tied into the existing on-site locational grid.

## **EQUIPMENT**

- Truck-mounted Geoprobe ground water sampling system with steel alloy
   and stainless steel rods
- Screen point ground water sampler
- 3) Stainless steel or Teflon mini-bailer
- 4) Soil sampling point with acetate insert
- 5) Peristaltic pump with battery power supply and Teflon tubing
- 6) Steam cleaner, DI water, Alconox for decontamination

## SAMPLING EQUIPMENT AND PROCEDURES

#### Description of Equipment

The Geoprobe sampler operates by inserting a string of one-inch diameter threaded steel alloy hollow rods vertically into the ground with the aid of a truck-mounted hydraulic ram capable of exerting 15,000 pounds of force. The system has an air hammer attachment to advance the rods into dense or hard materials. Rod sections are three feet long.

Two special sampling points will be used. The first is a soil sampler with two-foot long acetate inserts (Figure 1). The sampler is capable of recovering a soil core up to 24 inches long and 1.5 inches in diameter. The sampler is installed at the bottom of the sampling string and is advanced with the air hammer. After being advanced for two feet, the sampler is withdrawn and the soil sample removed for description. Continuous soil samples can be collected in this manner.

The second point is a screen point ground water sampler (Figure 2). This sampler is installed at the bottom of the sampling string and is advanced hydraulically or by air hammer to the desired sampling depth with decontaminated stainless steel rods. While driving, the point is sealed from outside contamination. At sampling depth, the sampling string is withdrawn two feet, the 0.0057" screen is exposed, and water enters the sampler. The water can then be retrieved to the surface by a Teflon or stainless steel mini-bailer, or pump. The bailers are 7/16" OD and 20 inches long with a ball and seat.

#### Sampling Procedures

Based upon previous drilling and Geoprobe work, sampling depth is expected to vary between 12 and 22 feet, the depth being and to be the Unit C till layer) that is very difficult to penetrate by hydraulic force alone. The

saturated sand unit appears to be only two to three feet thick in the off-site areas. If saturated unit thickness at any sampling location is four feet or greater, two samples will be collected for VOC analysis per four feet of saturated thickness at that location.

Two Geoprobe holes will be advanced at each sampling location. The first will be advanced using the soil sampler to collect continuous soil samples. Soil samples will be collected, described and measured by a WWES geologist to determine the stratigraphy of the sample location. Soil samples will be collected until three to five feet of the underlying Unit C till has been penetrated. The location of the saturated sand will be noted and this information will be used to determine the sampling depth for the screen point ground water sampler. Stratigraphic information will be recorded by the geologist for later incorporation into geologic cross sections. Soil samples will be retained and returned to the site for disposal.

Following completion of the first hole, the sampling string will be withdrawn, and the hole backfilled and sealed with bentonite granules. A second hole will be advanced one to three feet away from the first to a depth that will allow the exposed screen to sample water in the proper interval of the saturated sand. The sampling rods will be withdrawn two feet to expose the screen.

Water for CLP volatile organic compounds will be collected by a Teflon or stainless steel mini-bailer. Three bailers full of water will be collected and discarded into a plastic container for return to the site and disposal, then the water will be sampled. Water collected in this manner is carefully powed from the bailer into the VOA sample containers. Water for metals, and total and amenable cyanide will be collected by means of a portable peristaltic pump and Teflon tubing inserted down the hollow sampling train (Figure 3). Water is pumped directly into the sample containers. The volatile portion of

the sample will be collected first followed by metals and cyanide. Ground water samples for metals will have passed through the 0.0057" screen and will not be filtered after collection.

The sampling methods described allow:

- Volatiles samples to be collected without subjecting them to air pressures lower than ambient atmospheric pressure by bailing.
- Sufficient sample quantities for metals and cyanide analysis by peristaltic pumping.
- 3) Stratigraphic measurements which will be used to determine sampling depth, and will also be used to determine off-site stratigraphy.

Following withdrawal of the second tubing train, the hole will be backfilled with bentonite pellets, and a steel rebar stake will be installed flush with the ground at the site of the first (soil sampling) point to permit relocation of the sampling point. Sampling point elevations and coordinates with respect to the existing monitoring well system will be established by survey.

All samples collected, other than those collected for screening, will be submitted for analysis to Southwest Laboratories of Oklahoma, Inc. as noted in Section 1.1 of the project QAPP approved May 25, 1991

## Sampling Locations

See Figure 4. Ground water samples are proposed at four locations: between former Geoprobe locations SGP-6 and SGP-7 (PGP-1), south of GNS-4 (PGP-2), the vicinity of the Forsythe Street - Hamilton Avenue intersection (PGP-3), and adjacent to MW-12 (PGP-4). The latter sample will be used as a check against standard screened well and

bailer sampling that will also be conducted at MW-12. To assure that the edge of the plume is being monitored at PGP-3, water samples will be collected at several locations in the vicinity and analyzed using the on-board purge-and-trap GC before selecting the sampling point for the CLP samples.

## Sample Quantities. Containers and Preservation

Sample quantities, containers and preservation will be conducted as described in the project QAPP approved May 25, 1991 (see Table 1 of the QAPP).

## Sample Handling and Record Keeping

Sample handling and record keeping will be conducted in accordance with the project QAPP approved May 25, 1991 (see Section 4 and 5 of the QAPP).

#### OA/OC

## 1. Equipment Decontamination

All rods will be scrubbed in an Alconox solution, steam cleaned, rinsed with DI water and allowed to dry prior to use. All rods will be changed between holes such that rods will not be reused from sample point to sample point. Teflon tubing employed for the peristaltic pump will be decontaminated between sample points by pumping DI water through it for at least five minutes. The bailers will be cleaned with an Alconox detergent solution, rinsed with DI water and allowed to dry before use.

## 2. QA/QC Samples

QA/QC Geoprobe samples will be collected separately from on-site monitoring well samples. The following QA/QC samples will be collected for the volatiles analyses:

- 1 equipment blank
- 1 trip blank
- 1 duplicate
- 1 matrix spike/duplicate

The following QA/QC samples will be collected for metals and total and amenable cyanide:

- 1 equipment blank
- 1 duplicate

QA/QC samples will be collected in accordance with Section 4.10 of the QAPP.

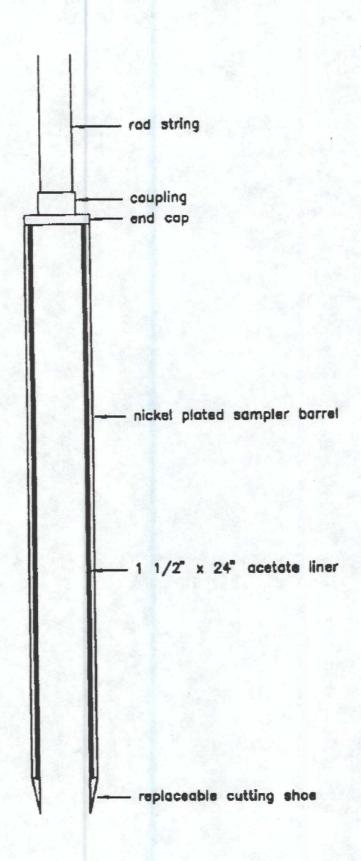


Figure 1. Soil sampler assembly.

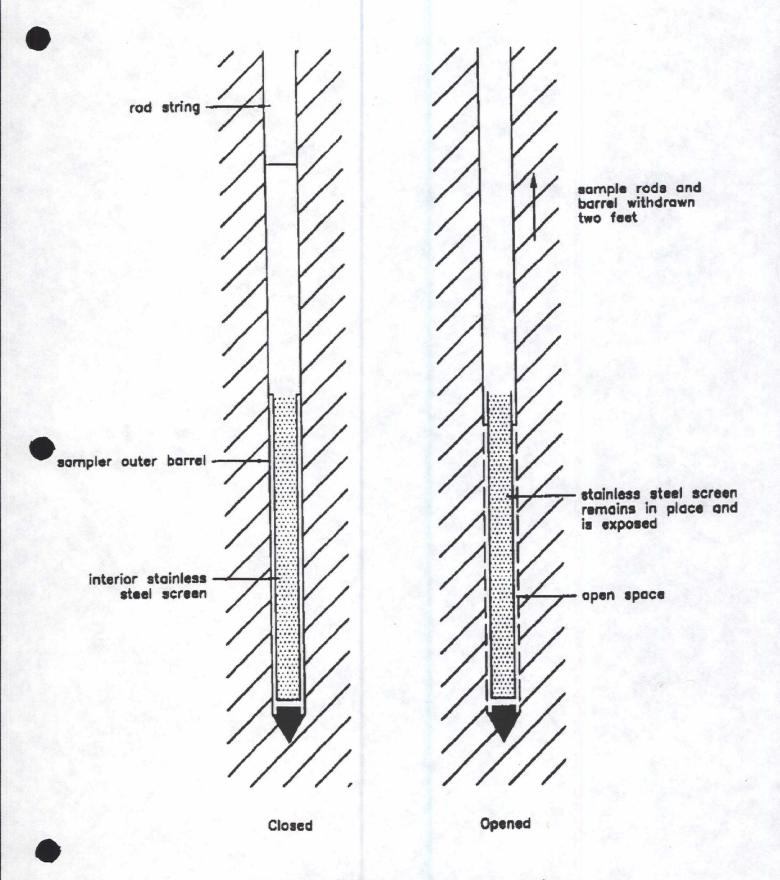


Figure 2. Screened ground water sampler.

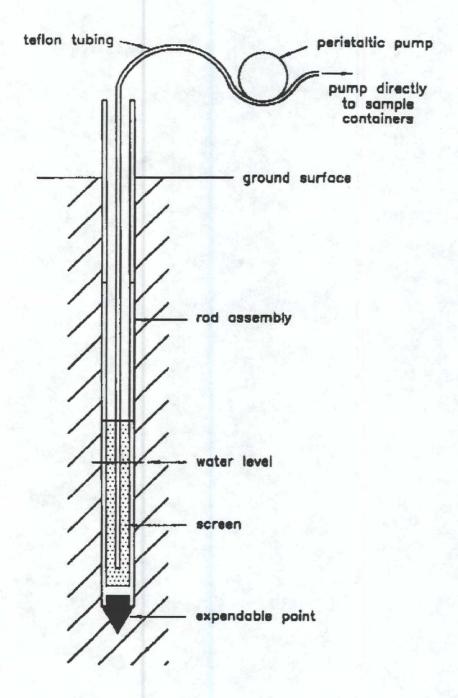


Figure 3. Sampling ground water for metals and cyanide by peristoltic pumping.

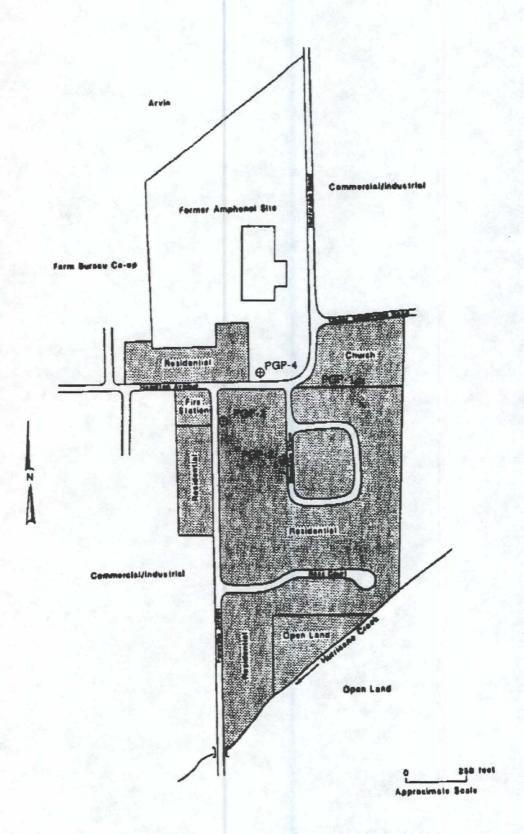


Figure 4. Locations of proposed Geoprobe sampling points.



December 2, 1992

Mr. William Buller U.S. EPA, Region V, 5HR-12 230 South Dearborn Street Chicago, Illinois 60603

Dear Mr. Buller:

In accordance with our telephone conversation of last week, I have prepared for your review an SOP for collecting ground water for CLP analysis using a Geoprobe test vehicle. If adopted, this SOP should be considered to be Appendix G of the May 25, 1991 QAPP approved by your agency. We believe that by utilizing the methods described in the SOP we can achieve accurate, reproducible results at our off-site sampling points. The draft SOP is attached for your review. If you have any questions, please get in touch with me.

Very truly yours,

James H. Keith Project Manager

cc: Susan Gard Sam Waldo

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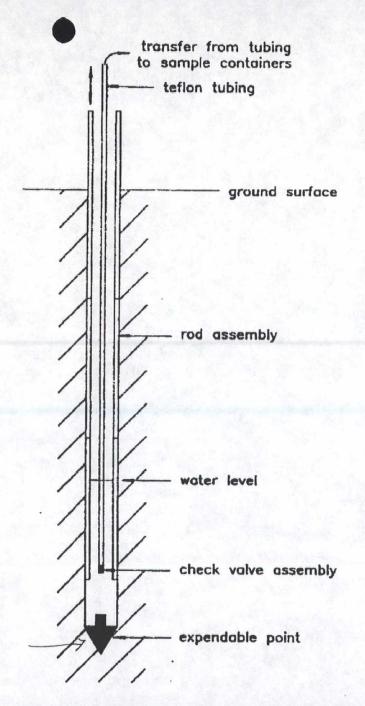


Figure 1a. Sampling ground water for volatiles by inertial pumping.

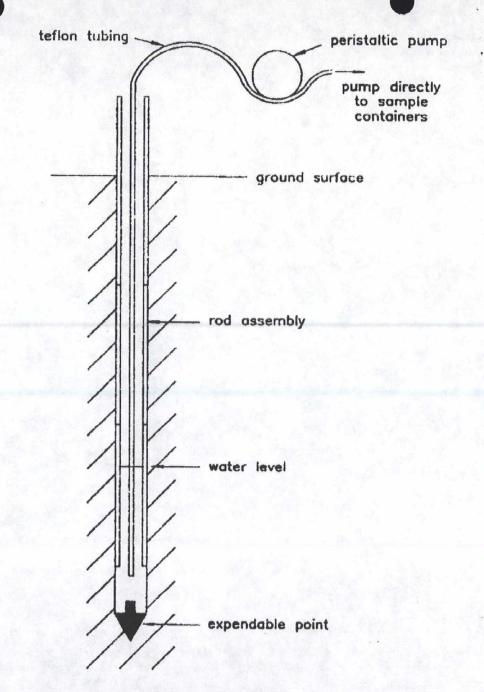


Figure 1b. Sampling ground water for metals and cyanide by peristaltic pumping.

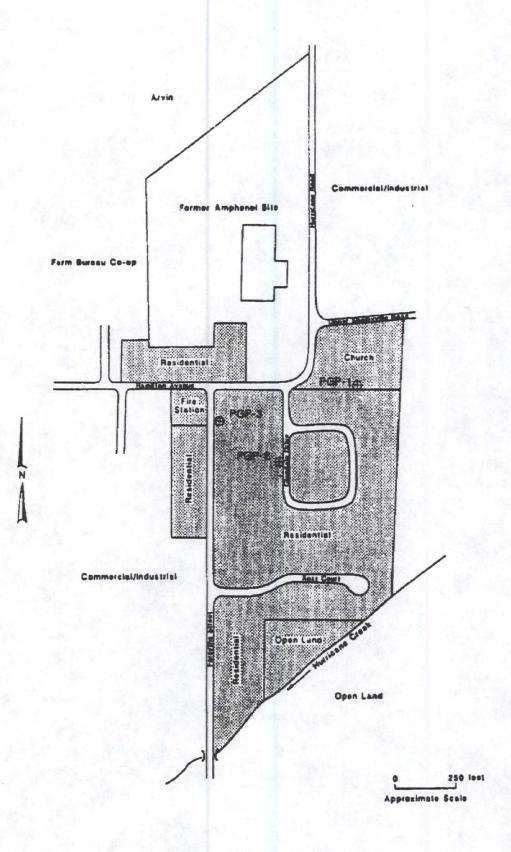


Figure 2. Locations of proposed off-site Geoprobe sampling points

#### SOP FOR OFF-SITE GEOPROBE GROUND WATER SAMPLING FOR CLP ANALYSIS FOR THE FORMER AMPHENOL SITE RFI

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#### EQUIPMENT

- Truck-mounted Geoprobe ground water sampling system with steel alloy and stainless steel rods
- 2) Screen point ground water sampler
- 3) Stainless steel or Teflon mini-bailer
- 4) Soil sampling point with acetate insert
- 5) Peristaltic pump with battery power supply and Teflon tubing
- 6) Steam cleaner, DI water, Alconox for decontamination

#### SAMPLING EQUIPMENT AND PROCEDURES

#### Description of Equipment

The Geoprobe sampler operates by inserting a string of one-inch diameter threaded steel alloy hollow rods vertically into the ground with the aid of a truck-mounted hydraulic ram capable of exerting 15,000 pounds of force. The system has an air hammer attachment to advance the rods into dense or hard materials. Rod sections are three feet long.

#### DRAFT APPENDIX G

## SOP FOR OFF-SITE GEOPROBE GROUND WATER SAMPLING FOR CLP ANALYSIS FOR THE FORMER AMPHENOL SITE RFI

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#### Equipment

- Truck-mounted Geoprobe ground water sampling system
- 2. Teflon tubing
- 3. Stainless steel check valve assembly
- 4. Peristaltic pump with battery power supply and Teflon tubing
- 5. Steam cleaner, DI water, Alconox for decontamination

## Sampling Procedure

The Geoprobe sampler operates by inserting a string of one-inch diameter threaded steel alloy hollow rods vertically into the ground with the aid of a truck-mounted hydraulic ram capable of exerting 10,000 pounds of force. The system has an air hammer attachment to advance the rods into dense or hard materials. Rod sections are three feet long, and have an expendable point at the bottom. Based upon previous drilling and Geoprobe work, sampling depth is expected to vary between 12 and 22 feet, the depth being controlled by a layer of material (assumed to be the Unit C till layer) that is very

difficult to penetrate by hydraulic force alone. Rods are advanced into the ground until they have been continuously advanced at least three feet (one rod length) by air hammer. Once this depth is reached, the rod assembly is withdrawn, leaving the point behind, to a depth at which water enters the hollow rod. In this manner, water from the bottom of the saturated sand is collected.

Water for CLP volatile organic compounds will be collected by inertial pumping utilizing dedicated Teflon tubing with a stainless steel check valve assembly inserted down the hollow sampling train (Figure 1a). Water collected in this manner is carefully poured from the tubing into the sample containers. Water for metals, and total and amenable cyanide will be collected by means of a portable peristaltic pump and Teflon tubing inserted down the hollow sampling train (Figure 1b). Water is pumped directly into the sample containers. The volatile portion of the sample will be collected first followed by metals and cyanide. Ground water samples for metals will not be filtered.

The two sampling methods described allow:

- Volatiles samples to be collected without subjecting them to air pressures
   lower than ambient atmospheric pressure by inertial pumping.
- Sufficient sample quantities for metals and cyanide analysis by peristaltic pumping.

Following withdrawal of the tubing train, the hole will be backfilled with bentonite pellets, and a steel rebar stake installed flush with the ground to permit relocation of the sampling point. Sampling point elevations and coordinates with respect to the existing monitoring well system will be established by survey.

#### Sampling Locations

See Figure 2. Ground water samples are proposed at three locations: between former Geoprobe locations SGP-6 and SGP-7 (PGP-1), south of GNS-4 (PGP-2), and along Forsythe Street south of its intersection with Hamilton Avenue (PGP-3).

#### Sample Quantities. Containers and Preservation

Each sample for volatile organic compounds will be transferred to two 40 mb VOA vials with Teflon septa, preserved with HCl to pH<2 and cooled to 4° C. Each sample for metals will be transferred unfiltered into a one liter polyethylene bottle, preserved with HNO3 to pH<2 and cooled to 4° C. Each sample for total and amenable cyanide will be transferred unfiltered into a one liter amber glass bottle, preserved with NaOH to pH>12 and cooled to 4° C.

#### Sample Handling and Recordkeeping

samplers will record the date and time each sample is collected, as well as the depth interval from which the sample was withdrawn. All sample containers will have a serially numbered sample tag attached as described in accordance with Section 5.2 of the QAPP. Samples will be immediately placed in coolers on Blue Ice to await shipment. Sample numbering will be in accordance with Section 4.12 of the QAPP. Prior to shipment, Chain-of-Custody forms will be filled out by the field sampling team leader. A copy of each completed form will be retained in a file and the originals will be packed in the shipping container.

#### OA/OC

#### 1. Equipment Decontamination

All rods will be scrubbed in an Alconox solution, steam cleaned, rinsed with DI water and allowed to dry prior to use. All rods will be changed between holes such that rods will not be reused from sample point to sample point. Teflon tubing employed for the inertial pump will be disposed of and new, clean, tubing will be used for each new hole. Teflon tubing employed for the peristaltic pump will be decontaminated between sample points by pumping DI water through it for at least five minutes. The check valve assembly will be cleaned with an Alconox detergent solution, rinsed with DI water and allowed to dry before use.

## QA/QC Samples

QA/QC Geoprobe samples will be collected separately from on-site monitoring well samples. The following QA/QC samples will be collected for the volatiles:

- 1 equipment blank
- 1 trip blank
- 1 duplicate
- 1 matrix spike/duplicate

The following QA/QC samples will be collected for metals and total and amenable cyanide:

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- 1 duplicate

QA/QC samples will be collected in accordance with Section 4.10 of the QAPP.

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The second point is a screen point ground water sampler (Figure 2). This sampler is installed at the bottom of the sampling string and is advanced hydraulically or by air hammer to the desired sampling depth with decontaminated stainless steel rods. While driving, the point is sealed from outside contamination. At sampling depth, the sampling string is withdrawn two feet, the 0.0057" screen is exposed, and water enters the sampler. The water can then be retrieved to the surface by a Teflon or stainless steel mini-bailer, or pump. The bailers are 7/16" OD and 20 inches long with a ball and seat.

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Based upon previous drilling and Geoprobe work, sampling depth is expected to vary between 12 and 22 feet, the depth being controlled by a layer of material (assumed to be the Unit C till layer) that is very difficult to penetrate by hydraulic force alone. The saturated sand unit appears to be only two to three feet thick in the off-site areas previously investigated, and there is expected to be no zonation of contaminants within the saturated unit.

Two Geoprobe holes will be advanced at each sampling location. The first will be advanced using the soil sampler to collect continuous soil samples. Soil samples will be collected, described and measured by a WWES geologist to determine the stratigraphy of

the sample location. Soil samples will be collected until three to five feet of the underlying Unit C till has been penetrated. The location of the saturated sand will be noted and this information will be used to determine the sampling depth for the screen point ground water sampler. Stratigraphic information will be recorded by the geologist for later incorporation into geologic cross sections. Soil samples will be retained and returned to the site for disposal.

Following completion of the first hole, the sampling string will be withdrawn, and the hole backfilled and sealed with bentonite granules. A second hole will be advanced one to three feet away from the first to a depth at which the bottom of the exposed screen will be just below the saturated sand. The sampling rods will be withdrawn two feet to expose the screen.

Water for CLP volatile organic compounds will be collected by a Teflon or stainless steel mini-bailer. Three bailerfuls of water will be collected and discarded into a plastic container for return to the site and disposal, then the water will be sampled. Water collected in this manner is carefully poured from the bailer into the VOA sample containers. Water for metals, and total and amenable cyanide will be collected by means of a portable peristaltic pump and Teflon tubing inserted down the hollow sampling train (Figure 3). Water is pumped directly into the sample containers. The volatile portion of the sample will be collected first followed by metals and cyanide. Ground water samples for metals will have passed through the 0.0057" screen and will not be filtered after collection.

The sampling methods described allow:

Volatiles samples to be collected without subjecting them to air pressures
 lower than ambient atmospheric pressure by bailing.

- Sufficient sample quantities for metals and cyanide analysis by peristaltic pumping.
- 3) Stratigraphic measurements which will be used to determine sampling depth, and will also be used to determine off-site stratigraphy.

Following withdrawal of the second tubing train, the hole will be backfilled with bentonite pellets, and a steel rebar stake will be installed flush with the ground at the site of the first (soil sampling) point to permit relocation of the sampling point. Sampling point elevations and coordinates with respect to the existing monitoring well system will be established by survey.

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## Sample Quantities. Containers and Preservation

Each sample for volatile organic compounds will be transferred to two 40-ml VOA vials with Teflon septa, preserved with HCl to pH<2 and cooled to 4° C. Each sample for metals will be transferred unfiltered into a one liter polyethylene bottle, preserved with HNO<sub>3</sub> to pH<2 and cooled to 4° C. Each sample for total and amenable cyanide will be transferred unfiltered into a one liter amber glass bottle, preserved with NaOH to pH>12

and cooled to 40 C.

## Sample Handling and Recordkeeping

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#### OA/OC

#### 1. Equipment Decontamination

All rods will be scrubbed in an Alconox solution, steam cleaned, rinsed with DI water and allowed to dry prior to use. All rods will be changed between holes such that rods will not be reused from sample point to sample point. Teflon tubing employed for the peristaltic pump will be decontaminated between sample points by pumping DI water through it for at least five minutes. The bailers will be cleaned with an Alconox detergent solution, rinsed with DI water and allowed to dry before use.

## 2. QA/QC Samples

QA/QC Geoprobe samples will be collected separately from on-site monitoring well samples. The following QA/QC samples will be collected for the volatiles:

- 1 equipment blank
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QA/QC samples will be collected in accordance with Section 4.10 of the QAPP.

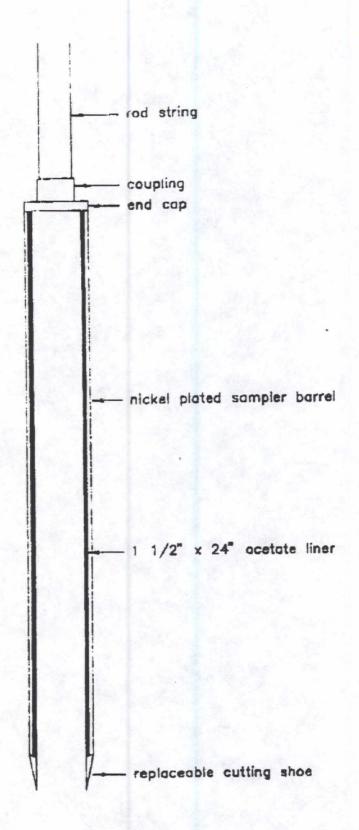


Figure 1. Soil sampler assembly.

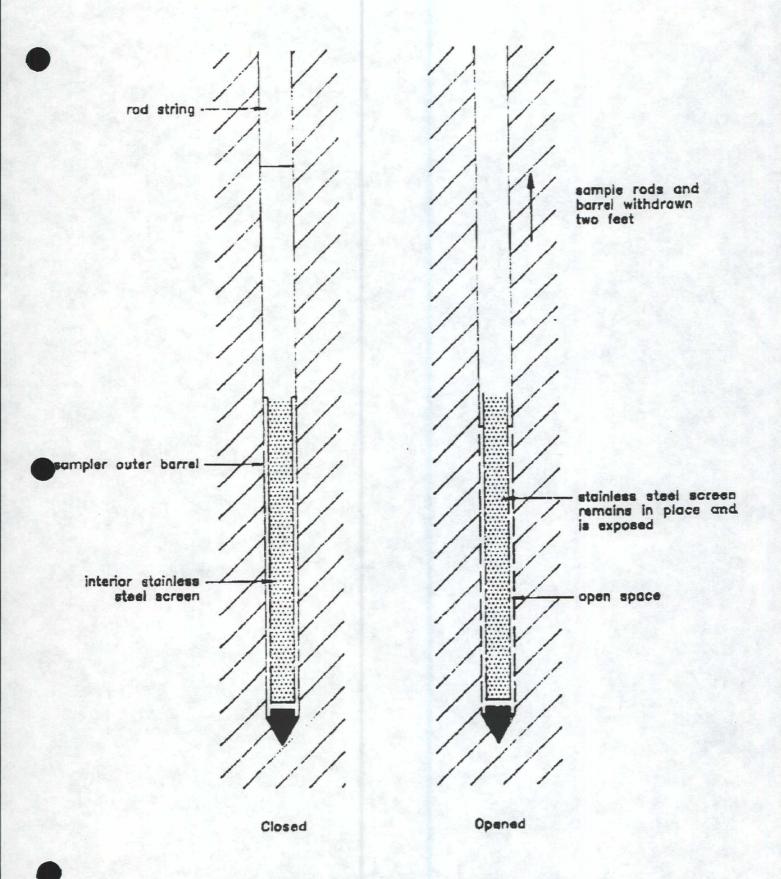


Figure 2. Screened ground water sampler.

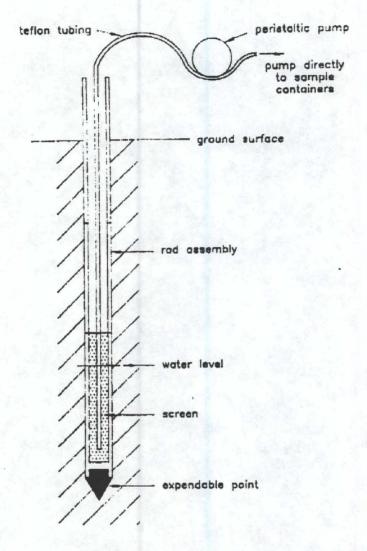


Figure 3. Sampling ground water for metals and cyonide by peristaltic pumping.

replaceable cutting shoe

Figure 1. Soil sampler assembly.

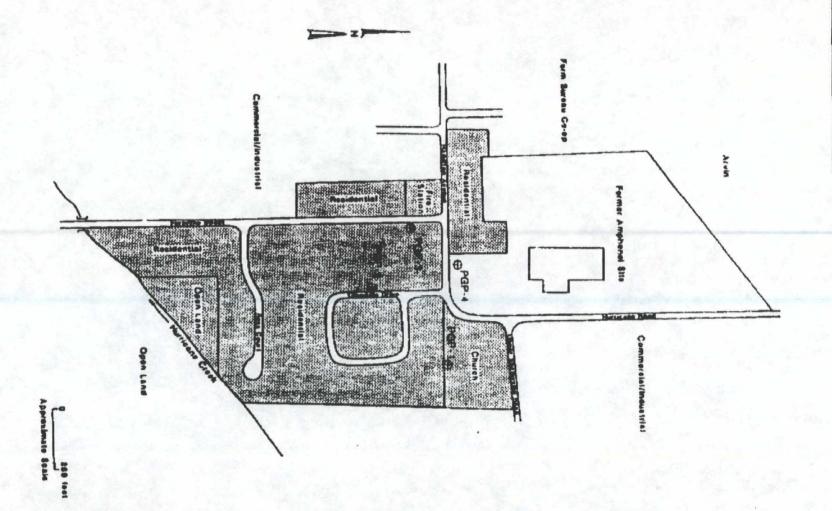


Figure 4. Locations of proposed Geoprobe sampling points.





## TECHNICAL MEMORANDUM

TO:

Mike Jarvis, President Franklin Power Products

400 Forsythe Street

Franklin, Indiana 46131

FROM:

James H. Keith, Project Manager

WW Engineering & Science

5010 Stone Mill Road

Bloomington, Indiana 47408

COPY:

William Buller

U.S. EPA, Region V, 5HR-12 230 South Dearborn Street Chicago, Illinois 60604

RE:

Results of November, 1992 Geoprobe ground water sampling results at the former

Amphenol facility at 980 Hurricane Road, Franklin, Indiana

DATE:

November 23, 1992

#### BACKGROUND

In accordance with the October 12 Work Plan for the installation of additional monitoring wells at the former Amphenol site, WW Engineering & Science and its subcontractor, Geotrace, Inc. performed a series of Geoprobe studies both on-site, and off-site in the Glendale Subdivision and along the storm sewer line east of the site. The purpose of the Geoprobe study was to locate the edge of the ground water contaminant plume in the Unit B saturated sand. Geoprobe work began on November 4 and ended November 6.

#### **METHODS**

Figure 1 shows the Geoprobe locations. Transect GNS is located off-site along the north-south Glendale Drive corridor, and all samples were collected from the west side of the road at the blacktop margin. Transect GWE is located off-site along the west-east Glendale Drive corridor, and all samples were collected form the north side of the road at the blacktop margin. Transect SGP was located on-site and off-site along the storm sewer line, and samples were collected four feet from the sewer centerline. Transect NGP was located on-site south and southeasterly from the southwest corner of the facility parking lot.

The Geoprobe system consists of a truck-mounted hydraulic ram that provides about 15,000 pounds of downward force to push a train of one-inch diameter hollow steel alloy rods into the ground to sampling depth. A percussion hammer assisted in driving the steel rods through blacktop and clay layers. Samples were collected of ground water in the unit B saturated sand. Sample depth was largely determined by a tough clay underlying the saturated sand, assumed to be the top of Unit C, through which rod penetration was very difficult. Once sampling depth was reached, the rod train was withdrawn several feet, leaving an expendable steel point in place in the ground and allowing ground water to flow into the hollow tube. Ground water was withdrawn from the tube by inertial pumping action utilizing dedicated polyethylene tubing and a check valve assembly, and placed in a VOA container. Following sample collection, the rod train was withdrawn from the ground and disassembled. The hole was backfilled with bentonite pellets. No water was introduced into any of the holes.

Rods were precleaned by GeoTrace. Only clean rods were used for the bottom of each new rod assembly. Rods that came in contact with ground water (usually the bottom six to nine feet) were replaced with clean rods and were not reused until they had been decontaminated. New polyethylene tubing was used for each sampling event and the check valve assembly was

decontaminated between holes by washing with a detergent solution, scrubbing, and rinsing thoroughly with DI water. Decontamination proceeded in accordance with the Work Plan.

The water samples were analyzed in a laboratory in the rear compartment of the truck. The purge-and-trap method was used for all analyses. A Tekmar LSC 2000 purge-and-trap apparatus was utilized to deliver purged samples into a Shimadzu GC-14A gas chromatograph that used a photoionization detector and an electron capture detector (PID/ECD). Specific contaminant concentrations were calculated by a Shimadzu CR-4A integrator. Target compounds for this study were tetrachloroethylene (PCE), trichloroethylene (TCE) 1,1,1-trichloroethane (TCA), and 1,1-dichloroethane (DCA). Only PCE, TCE and TCA were present in quantifiable amounts in the samples, and there did not appear to be unknown quantifiable peaks in any of the samples.

Method blanks were performed at a rate of one per ten samples, and at the beginning and end of each sampling day. Duplicate samples were also performed. Calibration standards and dilution analyses were run at the beginning of each sampling day, or more often if necessary.

Detection limits for the target compounds were approximately 1 ug/l.

#### RESULTS

Results are given in Table 1. All values are to the nearest ug/l, and the subcontractor report is attached as an Appendix. Depth refers to the interval in feet below the surface from which the ground water was sampled. BDL indicates that the constituent was not detected at the 1 ug/l detection limit. A ground water isoconcentration map for combined TCE, PCE and TCA in Unit B based upon the Geoprobe results and the March, 1992 RFI monitoring results is shown in Figure 1.

Table 1. Geoprobe ground water sampling results

Location	Depth	TCA	TCE	PCE	Comments
GNS-1	12-18	9	BDL	BDL	very hard at 15'
GNS-2	NA	NA	NA	NA	struck rock at 8'; no sample
GNS-3	12-15	6	BDL	BDL	very hard at 12'
GNS-4	12-15	4	BDL	BDL	very hard at 12'
GNS-6	12-15	BDL	BDL	BDL	very hard at 12'
GNS-8	12-13	BDL	BDL	BDL	very hard at 12'; little water in rods
GWE-1	12-15	5	BDL	BDL	very hard at 15'
GWE-2A	12-15	BDL	BDL	BDL	none
GWE-2B	12-15	BDL	BDL	BDL	duplicate of GWE-2 sample
GWE-4	12-14	BDL	BDL	BDL	none
SGP-1	17-21	37	108	358	near MW-12
SGP-2	17-21	7	3	BDL	none
SGP-3	17-21	10	3	BDL	none
SGP-4A	17-21	20	13	BDL	none
SGP-4B	17-21	14	11	BDL	duplicate of SGP-4 sample
SGP-5	12-14	10	9	6	off-site; near IT-3
SGP-6	12-14	16	13	2	off-site; rocks or gravel in fill
SGP-7	12-13.5	BDL	BDL	BDL	off-site; rocks or gravel in fill
SGP-8	12-15	BDL	BDL	BDL	off-site; near former IT-4
NGP-1	24	4	BDL	BDL	none
NGP-2	22.5-24	7	BDL	5	none
NGP-3	22-23	10	5	7	none
NGP-4	22-23	36	128	147	none
NGP-5	22-23	11	115	508	none
NGP-6	22-23	64	609	2753	near new sanitary sewer line

#### DISCUSSION

#### Background Levels

Section VII (4) (c) (i) of the Administrative Order on Consent states that the respondents shall properly delineate vertically and horizontally, on-site and off-site if necessary, the ground water contaminant plume at the Facility. The plume delineation shall be based on ground-water analytical data, though indirect methods may be used as supplemental data. The contaminant plume shall be delineated to the extent that at the periphery of the plume, concentrations either equal or are below upgradient background levels.

For the plume constituents, the following background concentrations were determined from the March, 1992 RFI sampling event:

TCA - 9 ug/l measured; detection limit 5 ug/l

TCE - 2 ug/l estimated; detection limit 5 ug/l

PCE - 3 ug/l estimated; detection limit 5 ug/l

DCA - not detected; detection limit 5 ug/l

Three of the four major constituents were identified in background samples, but two were below detection limits and are therefore estimated. The laboratory detection limits set forth in the approved QAPP will be used for plume delineation in the place of background values for any constituents identified below detection limits. This is 5 ug/l for each of the constituents.

#### Glendale Subdivision

The only contaminant detected in the Glendale Subdivision was TCA (MCL - 200 ug/l), the background level for this constituent. It had a high concentration of 9 ug/l at GNS-1. At GNS-4, approximately 250 feet south of the site, it was detected below 5 ug/l, and at GNS-6, 100 feet further south, it was not detected at the GeoTrace detection limit of 1 ug/l. TCA was detected below 5 ug/l at GWE-1 and was not detected at 1 ug/l at GWE-2. The water bearing sand in the Glendale Subdivision appears to extend to a depth of about 12 feet, below which is a clay layer which was very difficult to penetrate, possibly Unit C. The sand appears to be capped by a layer

of clay at a depth of about 8 feet, which was also very difficult to penetrate. At the southernmost extent, GNS-8, very little water was produced from the probe. GWE-4, on the other hand, readily produced adequate amounts of water for testing.

#### Storm Sewer Trench

TCA, TCE and PCE were all present in the storm sewer trench, but generally not at significant levels. They were highest at SGP-1 adjacent to MW-12, with lower levels found to the east along the storm sewer trench. There was no pattern of concentration increase or decrease with NO distance from the site. At SGP-7 and SGP-8, no VOCs were detected. It should be noted that well IT-4, used in the IT site assessment and since removed, was located near SGP-8 and water samples from this well did not produce any VOCs when sampled in 1985.

#### Southwest Parking Lot Corner

The westernmost sample from the NGP transect indicated a level of 4 ug/l for TCA, below the background level for this constituent. To the east, TCE and PCE appeared, and their ground water concentrations increased, but they are much lower than concentrations found in the north-south reach of the storm sewer to the east.

#### CONCLUSIONS AND RECOMMENDATIONS

#### Glendale Subdivision and Storm Sewer Trench

The Geoprobe results indicate that for the Glendale Subdivision:

- No significant southward extension of the plume is evident beyond the extent already measured by sampling data from IT-2 and IT-3.
- 2) Only one plume constituent is present beneath the subdivision (TCA), which has an MCL of 200 ug/l. TCA levels were measured between 4 and 9 ug/l.

- Wells IT-2 and IT-3 appear to be optimally placed to monitor changes in the quality of ground water moving off-site, and to monitor changes in ground water quality resulting from cleanup activities.
- 4) Evidence from Geoprobe activities suggests that the saturated Unit B sand has thinned considerably.
- 5) Evidence from Geoprobe activities suggests that water availability in the Unit B sand diminishes with distance from the site.

Geoprobe results from the storm sewer trench indicate that:

- All three plume constituents are present at various points along the trench, but
   PCE appears only sporadically.
- 2) The lack of a concentration gradient for plume constituents and relatively low concentrations is consistent with the notion that the trench acts as a ground water intercept only part of the time, and perhaps not along its entire length. We may be detecting only residual materials in the trench rather than a plume.

While the accepted method of monitoring the edge of a ground water contaminant plume is to install monitoring wells and to sample and analyze the water, we believe that off-site wells are more prone to damage or tampering and they increase the perception of a crisis to the public. Additionally, with the thinning of the sand unit and the diminution of available ground water in the Glendale Subdivision, they may not be effective as monitoring devices and would have to be abandoned. Wells IT-2 and IT-3 are, we believe, suitable for monitoring the edge of the plume given the data we have at hand. Along the storm sewer trench, there is ample evidence from IT-4, and from the Geoprobe results that the extent of contamination is limited in this area. We recommend no additional off-site wells be installed, and that wells IT-2 and IT-3 be utilized to monitor the downgradient plume boundary.

## Southwest Parking Lot Corner

The Geoprobe results indicate the presence of ground water contaminants in this area that have not previously been measured. We recommend the installation of monitoring wells as described in our Work Plan

APPENDIX

**GEOPROBE RESULTS** 

Note: SGP-4A and SGP-4B were both collected from a depth of 17-21 feet

# GEO TRACE, INC.—

environmental service company

PROJECT: Franklin Power Products

Franklin, Indiana

CLIENT:

Mr. Jim Keith

W. W. Engineering 5010 Stone Mill Road Bloomington, IN 47408

SAMPLE DATE:

November 4, 1992-November 6, 1992

REPORT DATE:

November 11, 1992

REPORT NUMBER: 9211321

This report summarizes groundwater sampling activities along with on-site purge and trap analyses at the above-referenced site. The groundwater samples were obtained by utilizing a ball and seat sampler attached to polytubing, or by using a stainless steel mini-bailer.

The purge and trap method was utilized for all on-site groundwater analyses. All purged samples were delivered from a Tekmar LSC 2000 into a Shimadzu GC-14A and specific contaminant concentrations were calculated by a Shimadzu CR-4A computer integrator using a Photo Ionization Detector and an Electron Capture Detector (PID/ECD). Twenty-five (25) samples were analyzed for PCE, TCA, and TCE. A total of forty-two (42) analyses were performed for quality assurance/quality control, including periodic blanks, calibration standards, and dilution analyses.

The purge and trap method utilized is a proven method for field screening of volatile organic compounds. Although at times results may prove similar to other laboratory methods, they may also prove to differ. The analytical procedure is one which provides a rapid screening for the targeted compounds with reproducible results.

Mr. James Keith and Mr. Marty Lytle of W. W. Engineering were present during sampling and directed sampling activities.

Upon reviewing the following results, please do not hesitate to call with any questions: Thank you for choosing Geo Trace, Inc. for your project.

# W. W. ENGINEERING

# FRANKLIN POWER PRODUCTS FRANKLIN, INDIANA

# Report 9211321

LOCATION	GNS-1	GNS-2	GNS-3	GNS-4	
TYPE	Groundwater	Groundwater	Groundwater	Groundwater	
DEPTH	12' - 18'	15'	12'-15'	12'-15'	
TCA	8.58		5.65	4.20	
TCE	BMDL	DRY HOLE	BMDL	BMDL	
PCE	BMDL		BMDL	BMDL	

LOCATION	GNS-6	GNS-8	GWE-1	GWE-2A Groundwater	
TYPE	Groundwater	Groundwater	Groundwater		
DEPTH	12' - 15'	12' - 13'	12' - 15'	12'-15'	
TCA	BMDL	BMDL	4.76	BMDL	
TCE	BMDL	BMDL	BMDL	BMDL	
PCE	BMDL	BMDL	BMDL	BMDL	

LOCATION	GWE-2B	GWE-4	SGP-1	SGP-2 Groundwater	
TYPE	Groundwater	Groundwater	Groundwater		
DEPTH	12' - 15'	12' - 14'	17' - 21'	17' - 21'	
TCA	BMDL	BMDL	37.06	6.83	
TCE	BMDL	BMDL	108.19	3.16	
PCE	BMDL	BMDL	357.88	BMDL	

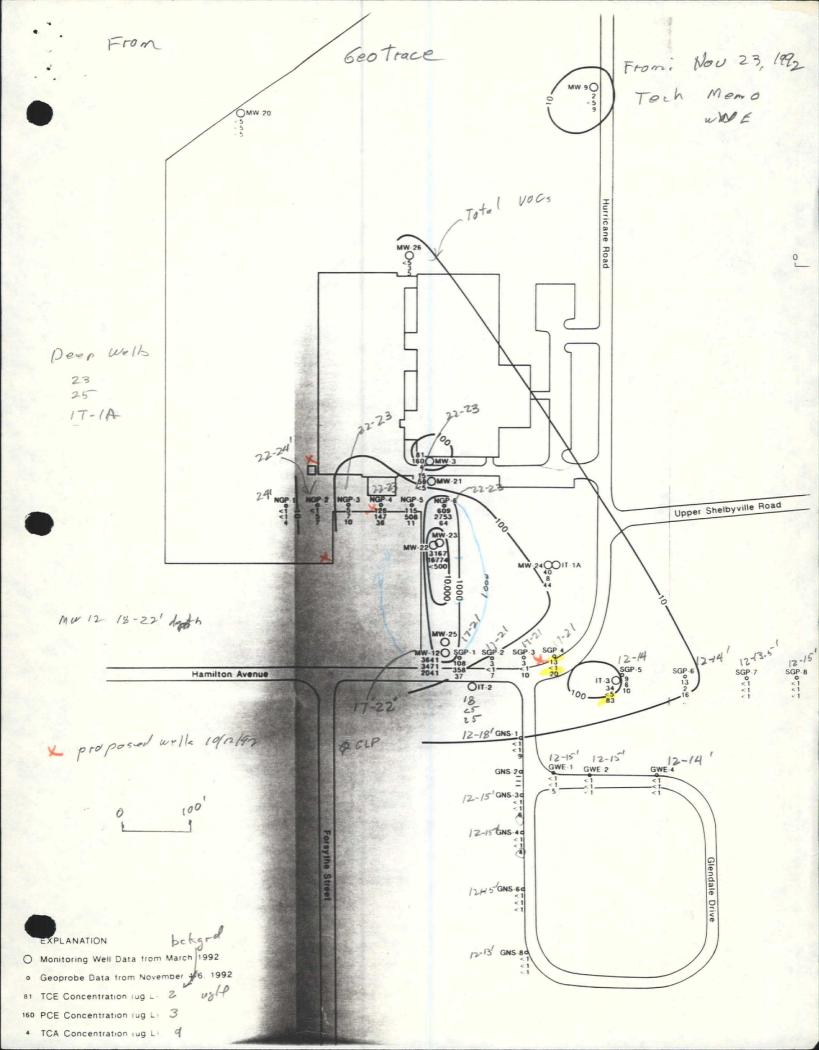
LOCATION	SGP-3	SGP-4A	SGP-4B	SGP-5	
TYPE	Groundwater	Groundwater	Groundwater	Groundwater	
DEPTH	17' - 21'	17' - 21'	12' - 14'	12' - 14'	
TCA	10.24	19.51	14.45	10.38	
TCE	3.37	13.20	10.75	8.96	
PCE	BMDL	BMDL	BMDL	6.19	

LOCATION	SGP-6	SGP-7	SGP-8	NGP-1	
TYPE	Groundwater	Groundwater	Groundwater	Groundwater	
DEPTH	12' - 14'	12' - 13.5'	12'-15'	24'	
TCA .	16.18	BMDL	BMDL	3.78	
TCE	12.86	BMDL	BMDL	BMDL	
PCE	1.89	BMDL	BMDL	BMDL	

LOCATION	NGP-2	NGP-3	NGP-4	NGP-5 Groundwater	
TYPE	Groundwater	Groundwater	Groundwater		
DEPTH	22.5' - 24'	22' - 23'	22' - 23'	22' - 23'	
TCA	7.15	10.06	35.78	10.98	
TCE	BMDL	4.73	127.53	115.48	
PCE	5.42	6.96	147.44	508.27	

LOCATION	NGP-6	ATEC *	
TYPE	Groundwater	DRUM (5)	
DEPTH	22' - 23'	COMPOSITE	
TCA	63.92	1.40	
TCE	608.54	BMDL	
PCE	2752.87	9.95	

<sup>\* =</sup> ANALYSIS SHOWED TWO (2) COMPOUNDS THAT WERE NOT TARGETED.
BMDL = BELOW METHOD DETECTION LIMIT
DETECTION LIMIT 1.00 PPB PER ANALYTE
ALL RESULTS REPORTED IN PARTS PER BILLION



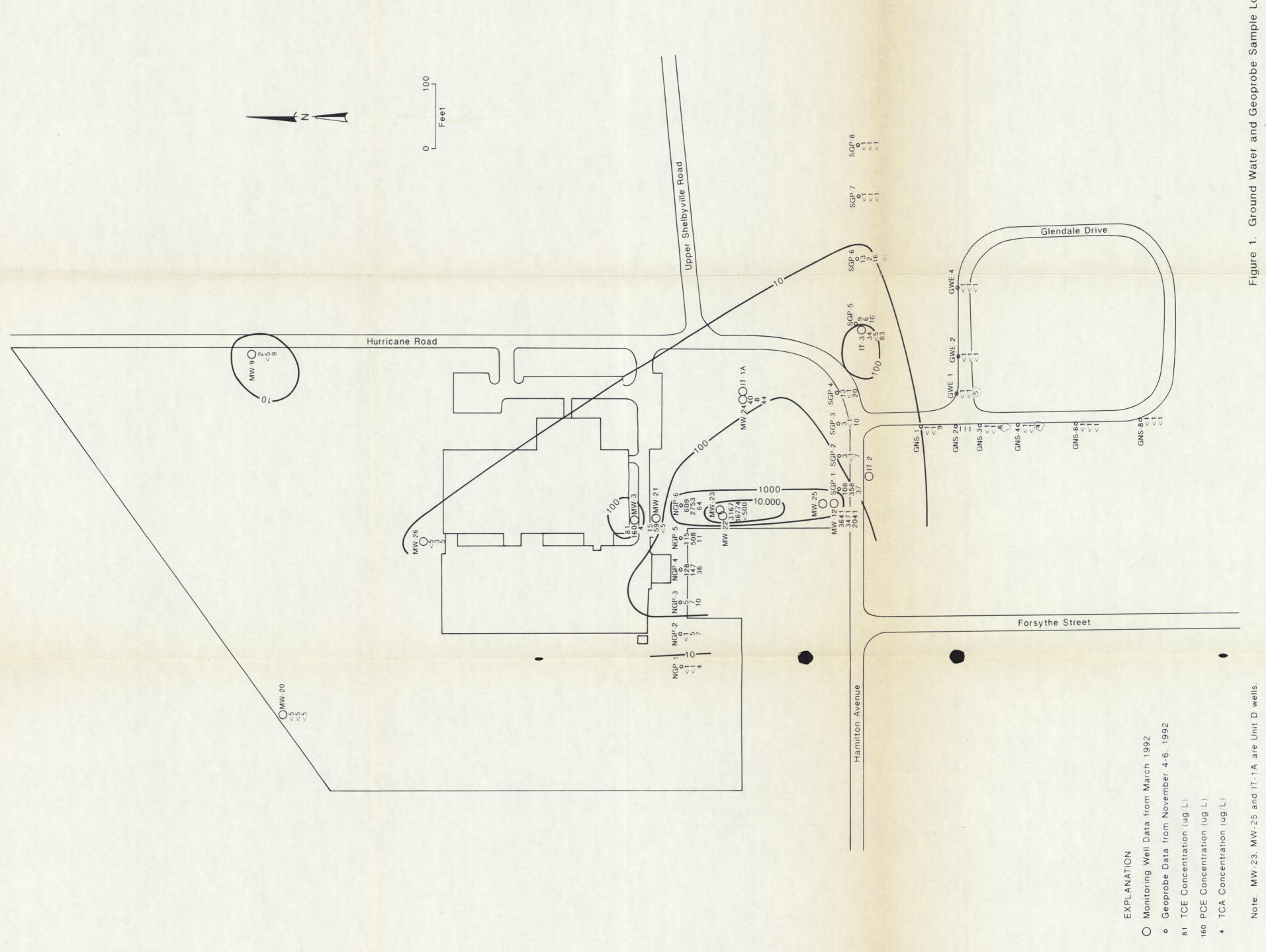


Figure 1. Ground Water and Geoprobe Sample Locations and Ground Water Isoconcentration Map for Combined TCE, PCE and TCA in Unit B.

OGT 13 1992

Work Plan

OFFICE OF RCRA
Waste Management Division
U.S. EPA. REGION V.

for

Installation of Additional Monitoring Wells and Sampling RCRA Facility Investigation (RFI) Former Amphenol Facility, Franklin, Indiana

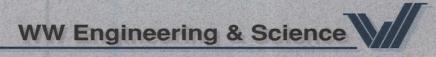
Prepared for

Franklin Power Products 400 Forsythe Street P.O. Box 667 Franklin, Indiana 46131

Prepared by

WW Engineering and Science 5010 Stone Mill Road Bloomington, Indiana 47408

October 12, 1992



# RCRA FACILITY INVESTIGATION WORK PLAN

for

# INSTALLATION OF ADDITIONAL MONITORING WELLS AND SAMPLING FORMER AMPHENOL FACILITY FRANKLIN, INDIANA

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#### Work Plan

#### for

# Installation of Additional Monitoring Wells and Sampling RCRA Facility Investigation (RFI) Former Amphenol Facility, Franklin, Indiana

#### 1.0 Introduction

#### 1.1 Background

This work plan is submitted to US EPA Region V, RCRA Enforcement Branch in accordance with the requirements of Section VII 2.a(4)(c)(iii) of the RCRA 3008(h) Administrative Order on Consent, and notification from US EPA received July 6, 1992. A draft technical memorandum concerning results of the initial RFI investigation (Phase I) was submitted to EPA on June 23, 1992. The memorandum concluded that:

- A soil gas survey suggested the presence of two separate shallow ground water contaminant plumes in the uppermost water bearing zone (Unit B). A trichloroethylene (TCE) plume apparently originates from near the crossing of the old sanitary sewer line and the storm sewer, and a tetrachloroethylene (PCE) plume apparently originates from near the southwest corner of the facility parking lot (Figure 1). The TCE plume appears to follow the trend of the old sewer line and the PCE plume has a northwest-southeast trend parallel to ground water flow direction in Unit B. PCE is the predominant VOC contaminant along the sanitary sewer line, but does not appear to occur south of the storm sewer line. PCE is subordinate in concentration to TCE in the easterly extension of the plume along the storm sewer line.
- 2) Ground water contamination, as defined by the summed concentration of the major plume components TCE, PCE and 1,1,1-trichloroethane (TCA) in Unit B monitoring wells is greatest along the old sanitary sewer line. Contamination extends off site to the south to the most distant existing ground water monitoring wells, and also easterly apparently along the storm sewer line.
- 3) Geologic cross sections of the site indicate a thinning of the Unit B water bearing zone to the south. It is not known if this thinning continues further south.
- 4) Contaminant plume components were detected in upgradient wells, but occur at concentrations at or near detection limits. Positive values at

upgradient MW-9 may be due to residual contamination from faulty well construction by ATEC. Detection limits may be the most appropriate means to delineate the plume.

- Ground water elevations in Unit B were found to occur below the invert elevation of the storm sewer, which has been previously postulated as acting as a ground water intercept. Ground water levels remained beneath the storm sewer for an extended period of time during the RFI field investigation, and the surface water sample at the storm sewer outfall was taken during this condition. It is thus impossible from these data to evaluate the effect of the ground water plume on the storm sewer water quality, or the effectiveness of the storm sewer as a ground water intercept.
- 6) The extent of ground water contamination cannot be delineated with the information obtained from the existing monitoring well system.
- 7) There is a downward hydraulic gradient between Units B and D and evidence of contaminants in Unit D. The source of the contamination to Unit D has not been completely evaluated.

In order to properly delineate the extent of ground water contamination, the June 23 memorandum recommended the following additional investigations:

- Evaluation of the potential separate PCE ground water plume associated with the southwest corner of the facility parking lot.
- 2) Installation of additional monitoring wells in Unit B to delineate the plume boundary in Unit B south of the storm sewer (off site).
- Evaluation of the storm sewer and storm sewer trench as a possible pathway for contaminant migration, and delineation of any plume extension along the storm sewer.
- 4) Evaluation of ground water flow patterns and contaminants in storm sewer water during periods when ground water levels are above the invert elevation of the storm sewer.
- 5) Evaluation of possible sources of contamination to Unit D, perhaps utilizing additional well purging and sample analysis.
- 6) Evaluation of Unit B thickness south of the site.

#### 1.2 Scope of Investigation

This document provides a Work Plan to delineate the horizontal and vertical extent of ground water contamination at the former Amphenol facility in Franklin, Indiana, and has been developed consistent with the recommendations contained in the June 23 memorandum. Sufficient samples will be collected to delineate the ground water plume to background concentration levels. The additional work will be conducted, as summarized in the following:

#### On site work

- . Geoprobe sampling of ground water in the PCE plume area, and adjacent to the storm sewer along the south side of the property
- . Install three additional monitoring wells on site (MW-27, 28, 29) to properly delineate the extent of contamination of the PCE plume
- . Install a monitoring well (MW-30) in the storm sewer trench
- . Purge and resample the three deep (Unit D) wells (IT-1A, MW-25, MW-23)
- . Continue monitoring ground water levels, and when conditions are favorable (relatively high ground water levels, and low storm water flow), sample the existing monitoring wells IT-2, IT-3, MW-12 and MW-22, new monitoring wells MW-27, MW-28, MW-29 and MW-30 and the storm sewer outfall

#### Off site work

- . Geoprobe sampling of ground water south of Hamilton Avenue
- . Install additional off site wells to define contaminant plume (estimate at least 3 depending upon Geoprobe results)
- . Sample newly installed off site wells

Some aspects of this Work Plan are currently being implemented. These activities include:

- . Collect available information of private water supply wells in the area south of the facility, and the extent of City of Franklin water service in this area
- Begin purging activity on the three deep wells

Obtain information on current ground water levels

Sample wells IT-2, IT-3, MW-12 and MW-22, and the storm sewer outfall, assuming ground water levels are up significantly from our previous surface water sampling event

The previous EPA approved RFI Work Plan (IT, October, 1988), as modified by the Administrative Order on Consent, and the approved Quality Assurance Project Plan (QAPP - May 25, 1991) will be utilized for specific field sampling procedures, and are herewith incorporated into this document. Certain other quality assurance procedures specific to proposed work are discussed below. A separate QAPP document has not been prepared. A Health and Safety Plan update is included in Section 4.

#### 2.0 Sampling Plan

#### 2.1 Waste Constituents

The initial RFI sampling and analysis effort has provided detailed information on ground water plume constituents (Table 1). Analyses were made for metals, VOCs, and total and amenable cyanide. Two wells (MW-12 and MW-22) were analyzed for the Appendix IX parameter list excluding organochlorine pesticides. Organic contaminants were limited to a small suite of VOCs which include PCE, TCE, TCA, 1,1-dichloroethane, 1,2-dichloroethylene, methylene chloride, acetone, and toluene. The methylene chloride, acetone, and toluene occur at very low levels, and may be laboratory artifacts (During the initial phase of the RFI work, acetone was detected in one of the QA/QC sampling trip blanks). No semivolatile, pesticide, herbicide, PCB, dioxin or furan compounds were detected. No total or amenable cyanide was detected in any monitoring well.

Based on the initial RFI data, no additional Appendix IX analyses are proposed. Ground water monitoring parameters for the Geoprobe study will be PCE, TCE, 1,1,1-TCA and 1,1-DCA. Monitoring parameters for the additional surface water, ground water and soil boring sampling will be metals, total and amenable cyanide, and VOCs (see Table 2).

# 2.2 Sampling Strategy

#### 2.2.1 Possible PCE Plume

The RFI soil gas survey suggested the presence of a possible PCE plume in Unit B ground water extending southeast from near the southwest corner of the back parking lot. There are no direct ground water monitoring data relative to the PCE concentration or extent of this plume. To define the extent of the plume, a series of Geoprobe hydraulic probe samples will be collected along an east-west transect near the south property line (Figure 1). This type of sampling will be

utilized to obtain small volume, discrete depth ground water samples for on site GC purge-and-trap analysis. This technique is a rapid, relatively inexpensive method for determining the best placement of shallow wells. It is anticipated that about six samples will be obtained on a 50 foot spacing (Figure 1). In addition, three additional monitoring wells are proposed in this area to define:

- 1) Highest PCE concentration in ground water, and to delineate the source of the PCE (MW-27).
- 2) The southwestern extent of the plume (MW-28)
- 3) The maximum concentration of volatiles in any plume leaving the south property boundary (MW-29)

One shallow and one deep soil sample will be obtained in the boring made for the MW-27 monitoring well for the purposes of risk assessment, and to possibly evaluate the source of contamination. The location of the MW-29 well will be based on the results of the Geoprobe survey. All wells will be about 20 feet in depth, and will be installed with a 10 foot well screen in the lower portion of Unit B. It is anticipated that the 10 foot screen will provide for sampling of the entire saturated thickness of the unit.

#### 2.2.2 Storm Sewer

Relatively high concentrations of VOCs occur in Unit B ground water both east and west of the storm sewer at MW-12 and SB-6, at the point where the storm sewer turns east and parallels Hamilton Avenue. The degree to which the storm sewer trench acts as a preferential ground water flow path eastward from this location will be evaluated. A series of Geoprobe ground water samples will be collected along the storm sewer alignment extending eastward from MW-12 and a single Unit B monitoring well will be located in the extreme southwestern portion of the property (MW-30, see Figure 1). The Geoprobe samples will be analyzed by on-site purge-and-trap GC. The monitoring well will be located as close as possible to the storm sewer trench. Depending upon Geoprobe results, additional Geoprobe tests may be conducted along the storm sewer east of Hurricane Road. If necessary, MW-30 may be installed east of Hurricane Road.

The RFI surface water sampling event occurred on February 27 during an extended period when ground water levels in Unit B were below the storm sewer invert elevation. Thus ground water could not be entering, and hence affecting, the quality of the sewer discharge. Although the surface water sample collected from the storm sewer outfall on February 27 contained no VOC or cyanide contamination, these data are of questionable value with respect of evaluating risk at times when ground water levels are high. It is thus proposed to resample the storm sewer outfall (Location SW-02) to provide analytical information, taken at a time when ground water levels are above the invert elevation of the sewer. Discharge of the storm sewer and Hurricane Creek at the time of sampling will also be measured.

#### 2.2.3 Possible Contamination in Unit D

Three wells (one existing and two installed during the initial portion of this RFI) sample ground water from the Unit D water bearing zone. No site background levels are available for deep wells, so ground water concentrations in Unit D wells are compared with 40 CFR Part 264 Subpart S action levels (proposed). The 40 CFR 264 Subpart S action levels are exceeded for PCE at IT-1A and MW-23 and for TCE at MW-23. PCE was detected in the other deep well (MW-25), although at an estimated concentration below the action level. It is noted however, that both new deep wells were installed through a Unit B water bearing zone containing PCE and TCE concentrations up to three orders of magnitude higher those detected in the deep monitoring wells (Table 1)

Despite the use of clean drilling techniques, and double casing, the contaminants detected in Unit D may be the result of the "carry down" of contamination in Unit B during drilling activity. This hypothesis may be tested by thoroughly purging the deep wells to remove any introduced contamination, and then resampling these wells. If the contaminants were introduced during well installation, it is anticipated that much lower VOC concentrations would be measured. The three deep wells will be purged and sampled. In the event that contamination is not detected, or is detected below Subpart S action levels, no additional wells will be proposed for installation. If contaminants are detected above Subpart S action levels then an additional downgradient monitoring well will be installed. The available data suggest a ground water flow direction in Unit D to the south.

# 2.2.4 Extent of Plume South of Hamilton Avenue

Because of the verification of ground water contamination in IT-2 and IT-3 located on private property south of Hamilton Avenue, additional ground water investigations must be performed in this area to determine the lateral extent of contamination. A Geoprobe survey is proposed in the area south of Hamilton Avenue. Based on the survey results, additional monitoring wells (about three anticipated) will be installed to define the limits of the contaminant plume. Actual locations will depend on both results of the Geoprobe survey and ability to secure access to private property or street right-of-ways consistent with the "best effort" requirement of Section XII of the Administrative Order on Consent. The Geoprobe survey technique will allow a minimum of property impact. We anticipate that the survey would most readily be performed along north-south and east-west transects within the right-of-way of Glendale Drive (see Figure 2 for Glendale Drive location).

#### 2.3 Monitoring and Data Collection Procedures

#### 2.3.1 Geoprobe Survey

The Geoprobe ground water investigations will be conducted by Geo Trace, Inc. under the supervision of WW Engineering and Science. The purpose of the Geoprobe study is to provide rapid, relatively inexpensive ground water contaminant data for the purpose of locaing ground water monitoring wells. Geo Trace previously was contracted to conduct the soil gas sampling. Ground water samples will be obtained by hydraulically pushing one-inch diameter hollow steel alloy rods into the ground to the sampling depth. Ground water samples will be obtained from near the base of Unit B, and sample depth will be determined from previous soil boring data.

Ground water enters the hollow steel rod through milled slots in the lead rod assembly. A ground water sample is retrieved from the steel rods utilizing dedicated nominal three-eights inch polyethylene tubing equipped with a stainless steel foot valve assembly. This tubing is inserted into the hollow steel rod and a ground water sample is pumped to the surface via inertial action generated via up and down movement of the tubing. Samples are collected in 40 ml VOA vials and are analyzed by on site by purge-and-trap GC utilizing a Shimadzu GC-14A gas chromatograph equipped with a Tekmar LSC 2000 purge-and-trap apparatus.

A 60 meter Restek capillary column is utilized. Anticipated column conditions for the analysis are:

- . 3 minutes @ 45°C
- . ramp to 100°C @ 4°C/min.
- . 4 minutes@ 100°C

Quantification of the target compounds PCE, TCE, 1,1,1-TCA and 1,1-Dichloroethane will be accomplished utilizing external standards typically at 5, 25 and 50 ug/l concentrations. Both a flame ionization detector (FID) and electron capture detector (ECD) are utilized. Quantification of individual analyses is based on peak area response as calculated by a Shimadzu CR4A electronic integrator. Retention time windows are used to establish compound identity. Anticipated detection limits for each target compound are about 2 ug/l.

# 2.3.2 Unit B Soil Boring and Monitoring Well Installation

Soil borings for monitoring well installation will be made utilizing the procedures contained in Section 4.2 of the 1988 IT RFI Work Plan, except as described below. Borings will be made by conventional hollow stem auger and split spoon sampling techniques. Samples will be described by a geologist who will maintain a detailed boring log. The log will be utilized to characterize and determine the thickness of the Unit B water bearing zone. Samples from each boring will be screened using HNu headspace procedures, and results of this screening will be reported on the

drilling log. Samples will be collected on a 2.5 foot interval to total depth into the top of Unit C. Drill cuttings and samples showing positive HNu response will be drummed for possible disposal.

Monitoring wells will be installed according to the procedures outlined in Section 4.2 of the 1988 IT RFI Work Plan. Clean water from the Franklin public water supply will be utilized as necessary to prevent bridging of sand in augers, and to hydrate bentonite pellets as necessary prior to placing the cement annular seal. Wells will be developed by bailer surging or overpumping. Purge water from all monitoring wells will be contained in polyethylene tanks for later discharge directly to the City of Franklin sewer system, with permission of the utilities department.

#### 2.3.3 Soil Sampling

The soil samples obtained from the MW-27 boring will be collected according to the procedures outlined in Section 4.8 of the QAPP.

#### 2.3.4 Unit D Well Purging

Deep monitoring wells IT-1A, MW-23 and MW-25 will be purged with a Grunfos 2-inch submersible pump. The pump will be lowered into the well on a braided stainless steel line. Power will be supplied by a portable 240V generator. Each well will be pumped at a rate consistent with yield of the well until approximately 200 to 300 gallons of water is purged from the well. Purged water will be discharged directly to the municipal sanitary sewer via manholes on the property.

#### 2.3.5 Ground Water Sampling

Ground water sampling will be done only after wells have stabilized after purging, and will be conducted according to the procedures outlined in Sections 4.1 and 4.5 of the QAPP. The presence of immiscible high and low density contaminant layers will be detected using an interface probe or clear acrylic bailer. Samples will be collected for VOCs, metals, and total and amenable cyanide (Table 2). Ground water samples will not be filtered for metals or cyanide, but both filtered and unfiltered samples from two of the Unit B wells will be analyzed for metals to compare total and dissolved phase concentrations of metal constituents (Table 2).

# 2.3.6 Surface Water Sampling

The surface water sample collected from the storm sewer outfall will be collected according to the procedures outlined in Section 4.6 of the QAPP. Discharge of both the storm sewer outfall and Hurricane Creek at the outfall point will be measured at the time of sample collection using either a flume or an appropriate current meter.

#### 2.3.7 Equipment Decontamination

Equipment decontamination will follow the procedures outlined in Section 4.13 of the QAPP. Decontamination of the sampling train for the Geoprobe survey will involve washing of the hollow steel rods and foot valve in warm water Alconox detergent, rise with tap water, and a final rinse with DI water. The polyethylene tubing utilized in the sampling is expendable and is not utilized for more than one sample.

The Grunfos submersible pump and drop hose will be washed in an Alconox detergent solution, rinsed with tap water, and then rinsed in D.I. water, prior to use, and after use. Detergent solutions, and tap water rinsate will be circulated through the pump between wells.

#### 3.0 Quality Assurance/Quality Control

The Quality Assurance provisions of the QAPP will apply to this sampling and analysis.

#### 3.1 QA/QC Samples

The following QA/QC samples for soil and ground water samples will be collected:

Sample Type	Analyses	Frequency
Equipment blank	All	1 per 10 samples
Trip blank	VOCs	1 per sample case
Duplicate	All	1 per 10 samples
Matrix Spike/		
Duplicate	VOCs	1 per 20 samples

No trip blank or Matrix/Spike Duplicate samples will be analyzed for the Geoprobe survey work. Equipment blanks for the Geoprobe survey work will be made by sampling a container of reagent grade D.I. water utilizing a normally decontaminated sampling train and a clean section of polyethylene tubing. See Table 2 for a summary of QA/QC Samples.

# 4.0 Health and Safety Plan Amendment

This section amends the existing October, 1988 IT RFI Work Plan and January, 1992 project Health and Safety Plans and provides field procedures to be followed with respect to the implementation of sampling, as proposed in this Work Plan.

# 4.1 Geoprobe Survey

The Geoprobe ground water survey will be carried out in Level "D" personal protective equipment. Continuous air monitoring in the breathing zone will be conducted utilizing an

HNu/PID or OVA/FID. Relevant action levels for upgrading personal protection levels are found in Section 6.4.2 of the October, 1988 IT RFI Work Plan, and are as follows:

Level D: Background to 5 ppm above background in the breathing zone.

Level C: Monitor readings of 5-20 ppm above background in the breathing zone, sustained for five minutes.

Level B (or withdraw from the work area): Monitor readings of 20 ppm in the breathing zone, sustained for 5 minutes.

# 4.2 Installation of Phase II Monitoring Wells

Health and Safety procedures governing soil boring and monitoring well installation are contained in Section 6 of the October, 1988 IT RFI Work Plan. Points of emphasis for this work shall include:

Location of buried utilities prior to drilling, particularly along Hamilton Avenue (this should be done in conjunction with and prior to the Geoprobe survey).

Establishment of a 30 foot exclusion zone surrounding the drilling rig.

Reestablishment of the decontamination area for drill rig and drill tools, according to Section 6.7.2 of the January, 1992 Health and Safety plan.

Drilling work will be conducted in modified Level D.

# 4.3 Monitoring Well Purging and Sampling

Monitoring well purging and sampling will be conducted in modified Level D protection. Personnel will wear eye protection and "4H" chemically resistant liners beneath nitrile gloves for sampling. Previous air monitoring data indicate that VOCs are not present in the breathing zone above background levels.

# 4.4 Off Site Work Zones

Off site work zones established during Geoprobe sampling and additional monitoring well installation will be delineated with caution tape or signs. Temporary barriers will be installed to prevent unauthorized entry into the work zone when equipment must remain in off site areas overnight.

## 5.0 Community Relations

Figure 2 shows the area of concern within which individual residents and landowners will be notified by letter regarding ground water conditions and off site activities. All notification by letter will be accomplished by the Johnson County Health Department in cooperation with Franklin Power Products and WW Engineering & Science. Any persons utilizing private ground water wells for domestic within the area of the defined plume use will be contacted directly and options for providing alternate water supplies will be discussed, such as connection to a public water supply and/or provision of bottled water. Owners of wells for nondomestic use within the area of the defined plume will be contacted directly and options for closing wells will be discussed.

From present available data, it appears that no residents within the area of concern shown in Figure 2 utilize private ground water wells for drinking purposes.

If additional work determines that the ground water plume extends beyond the area shown in Figure 2 the impacted residents will also be notified by letter.

Table 1
Analytical Data for Ground Water
Former Amphenol Site, Franklin, IN
Units as Given

Location:		GWIT-1A	GWIT-2	GWIT-3	MW-03	MW-09	MW-12	MW-20	MW-21Dup	MW-21
Sample Identification: Sample Date:		894311 03/05/92	894313 03/05/92	894301 03/05/92	892911 03/02/92	894304 03/05/92	892902 03/02/92	894307 03/05/92	894308 03/05/92	894309 03/05/92
Volatiles	Units	03/03/92	03/03/22	03/03/32	03/04/2	03/03/22	03/02/32	02/02/32	03/03/72	05/05/72
Chloromethane	ug/L	10 U	<500	10 U	10 U	10 U				
Bromomethane	ug/L	10 U	<500	10 U	10 U	10 U				
Vinyl chloride	ug/L	10 U	<500	10 U	10 U	10 U				
Chloroethane	ug/L	10 U	<500	10 U	10 U	10 U				
Methylene chloride	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
Acetone	ug/L	8 J	11	10 U	10 U	7 J	<500	10 U	10 U	10 U
Carbon disulfide	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
1,1-Dichloroethylene	ug/L	5 U	5 Ų	5 U	5 U	5 U	<250	5 U	5 U	5 U
1,1-Dichloroethane	ug/L	5 U	41	4 J	5 U	5 U	103 J	5 U	5 U	5 U
trans-1,2-Dichloroethylene	ug/L						<250			
Chloroform	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
1,2-Dichloroethane	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
Methyl ethyl ketone	ug/L	10 U	<500	10 U	10 U	10 U				
1,1,1-Trichloroethane	ug/L	5 U	25	83	4 J	9	2041	5 U	0.8 J	5 U
Carbon tetrachloride	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
Vinyl acetate	ug/L						<500			
Dichlorobromomethane	ug/L	5 U	5 U	· 5 U	5 U	5 U	<250	5 U	5 U	5 U
1,1,2,2-Tetrachloroethane	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
1,2-Dichloropropane	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
trans-1,3-Dichloropropene	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
Trichloroethylene	ug/L	5 U	18	34	81	2 J	2641	5 U	14	15
Dibromochloromethane	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
1,1,2-Trichloroethane	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
Benzene	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
cis-1,3-Dichloropropene	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
2-Chloroethylvinyl ether	ug/L						<500			
Bromoform	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
2-Hexanone	ug/L	10 U	<500	10 U	10 U	10 U				
Methyl isobutyl keytone	ug/L	10 U	<500	10 U	10 U	10 U				
Tetrachloroethylene	ug/L	9	5 U	5 Ü	160	5 U	3471	5 U	58	59
Toluene	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U

Table 1
Analytical Data for Ground Water
Former Amphenol Site, Franklin, IN
Units as Given

					min do Orre					
Location; Sample Identification: Sample Date:		GWIT-1A 894311 03/05/92	GWIT-2 894313 03/05/92	GWIT-3 894301 03/05/92	MW-03 892911 03/02/92	MW-09 894304 03/05/92	MW-12 892902 03/02/92	MW-20 894307 03/05/92	MW-21Dup 894308 03/05/92	MW-21 894309 03/05/92
Volatiles	Units			一步,直接						
Chlorobenzene	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
Ethylbenzene	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
Styrene	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
Xylene	ug/L	5 U	5 U	5 U	. 5U	5 U	<250	5 U	5 U	5 U
Acrolein	ug/L						<2500			
Iodomethane	ug/L					L 3 3	<250			
3-Chloropropene	ug/L						<250			
Chloroprene	ug/L						<250			
trans-1,4-Dichloro-2-butene	ug/L			Landy Co		160	<250		A- 1	
Pentachloroethane	ug/L						<250			
Acetonitrile	ug/L						<5000	Park 3		
Acrylonitrile	ug/L						<2500			
Penta CDF	ug/L					5	<500			
Methacrylonitrile	ug/L		The state of the s				<2500			
Isobutyl alcohol	ug/L						<5000	A TOWN		
1,4-Dioxane	ug/L						<25000			
Methyl methacrylate	ug/L						<250			
Pyridine	ug/L						<5000			
Ethyl methacrylate	ug/L						<250			
1,2-Dibromoethane	ug/L						<250	3	R I was	
1,1,1,2-Tetrachloroethane	ug/L			4			<250			
1,2,3-Trichloropropane	ug/L						<250			
Dichlorodifluoromethane	ug/L					2.3	<250		, Y ±	
Trichlorofluoromethane	ug/L						<250			
Dibromomethane	ug/L	The last					<500			
1,2-Dichloroethylene	ug/L	5 U	78	5 U	5 U	5 U		5 U	5 U	5 U

Table 1
Analytical Data for Ground Water
Former Amphenol Site, Franklin, IN
Units as Given

			Units a.	Given			
Location: Sample Identification: Sample Date:		MW-22 892904 03/02/92	MW-23Dup 894302 03/05/92	MW-23 894303 03/05/92	MW-24 892909 03/02/92	MW-25 897901 03/11/92	MW-26 894312 03/05/92
Volatiles	Units						UJI COI / Z
Chloromethane	ug/L	<1000	10 U	10 U	10 U	10 U	10 U
Bromomethane	ug/L	<1000	10 U	10 U	10 U	10 U	10 U
Vinyl chloride	ug/L	<1000	10 U	10 U	10 U	10 U	10 U
Chloroethane	ug/L	<1000	10 U	10 U	10 U	10 U	10 U
Methylene chloride	ug/L	<500	5 U	5 U	2 J	5 U	5 U
Acetone	ug/L	<1000	10 U	10 U	10 U	10 U	10 U
Carbon disulfide	ug/L	<500	5 U	5 U	5 U	5 U	5 U
1,1-Dichloroethylene	ug/L	<500	5 U	5 U	5 U	5 U	5 U
1,1-Dichloroethane	ug/L	<500	5 U	5 U	5 U	5 U	5 U
trans-1,2-Dichloroethylene	ug/L	<500					
Chloroform	ug/L	<500	5 U	5 U	5 U	5 U	5 U
1,2-Dichloroethane	ug/L	<500	5 U	5 U	5 U	5 U	5 U
Methyl ethyl ketone	ug/L	<1000	10 U	10 U	10 U	10 U	10 U
1,1,1-Trichloroethane	ug/L	<500	5 U	5 U	44	5 U	5
Carbon tetrachloride	ug/L	<500	5 U	5 U	5 U	5 U	5 U
Vinyl acetate	ug/L	<1000					1947
Dichlorobromomethane	ug/L	<500	5 U	5 U	5 U	5 U	5 U
1,1,2,2-Tetrachloroethane	ug/L	<500	5 U	5 U	5 U	5 U	5 U
1,2-Dichloropropane	ug/L	<500	5 U	5 U	5 U	5 U	5 U
trans-1,3-Dichloropropene	ug/L	<500	5 U	5 U	5 U	5 U	5 U
Trichloroethylene	ug/L	3167	5	7	40	5 U	5 U
Dibromochloromethane	ug/L	<500	5 U	5 U	5 U	5 U	5 U
1,1,2-Trichloroethane	ug/L	<500	5 U	5 U	5 U	5 U	5 U
Benzene	ug/L	<500	5 U	5 U	5 U	5 U	5 U
cis-1,3-Dichloropropene	ug/L	<500	5 U	5 U	5 U	5 U	5 U
2-Chloroethylvinyl ether	ug/L	<1000	(				
Bromoform	ug/L	<500	5 U	5 U	5 U	. 5 U	5 U
2-Hexanone	ug/L	<1000	10 U	10 U	10 U	10 U	10 U
Methyl isobutyl keytone	ug/L	<1000	10 U	10 U	10 U	10 U	10 U
Tetrachloroethylene	ug/L	16774	40	47	8	2 J	3 J
Toluene	ug/L	<500	5 U	5 U	1 J	5 U	5 U

Table 1
Analytical Data for Ground Water
Former Amphenol Site, Franklin, IN
Units as Given

Location:		MW-22	MW-23Dup	MW-23	MW-24	MW-25	MW-26
Sample Identification:	- 46	892904	894302	894303	892909	897901	894312
Sample Date:	77 .	03/02/92	03/05/92	03/05/92	03/02/92	03/11/92	03/05/92
Volatiles	Units						
Chlorobenzene	ug/L	<500	5 U	5 U	5 U	5 U	5 U
Ethylbenzene	ug/L	<500	5 U	5 U	5 U	5 U	5 U
Styrene	ug/L	<500	5 U	5 U	5 U	5 U	5 U
Xylene	ug/L	<500	5 U	5 U	5 U	5 U	5 U
Acrolein	ug/L	<5000					
Iodomethane	ug/L	<500					
3-Chloropropene	ug/L	<500					
Chloroprene	ug/L	<500					
trans-1,4-Dichloro-2-butene	ug/L	<500					
Pentachloroethane	ug/L	<500					
Acetonitrile	ug/L	<10000					
Acrylonitrile	ug/L	<5000					
Penta CDF	ug/L	<1000					
Methacrylonitrile	ug/L	<5000					
Isobutyl alcohol	ug/L	<10000					
1,4-Dioxane	ug/L	<50000					
Methyl methacrylate	ug/L	<500					
Pyridine	ug/L	<10000					
Ethyl methacrylate	ug/L	<500					
1,2-Dibromoethane	ug/L	<500			1.		The same
1,1,1,2-Tetrachloroethane	ug/L	<500					Control of the contro
1,2,3-Trichloropropane	ug/L	<500			1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		
Dichlorodifluoromethane	ug/L	<500	. ax				
Trichlorofluoromethane	ug/L	<500					
Dibromomethane	ug/L	<1000					
1,2-Dichloroethylene	ug/L		5 U	5 U	5 U	5 U	5 U

#### Footnotes:

U = Chemical not detected at specified detection limit.

J = Estimated value.

Table 1 Analytical Data for Ground Water Former Amphenol Site, Franklin, IN Units as Given

Location: Sample Identification:		GW-103EB 892901	MW-12 892902	MW-22 892904	MW-22Duj 892906
Sample Date:	M. Krigazyalowii	03/04/92	03/02/92	03/02/92	03/02/92
Semi-Volatiles	Units			The state of the s	
Phenol	ug/L	<20	<20	<20	<20
Bis(2-chloroethyl)ether	ug/L	<20	<20	<20	<20
2-Chlorophenol	ug/L	<20	<20	<20	<20
1,3-Dichlorobenzene	ug/L	<20	<20	<20	<20
1,4-Dichlorobenzene	ug/L	<20	<20	<20	<20
Benzyl alcohol	ug/L	<20	<20	<20	<20
1,2-Dichlorobenzene	ug/L	<20	<20	<20	<20
o-Cresol .	ug/L	<20	<20	<20	<20
Bis(2-chloroisopropyl)ether	ug/L	<20	<20	<20	<20
m,p-Cresol	ug/L	<20	<20	<20	<20
n-Nitrosodi-n-propylamine	ug/L	<20	<20	<20	<20
Hexachloroethane	ug/L	<20	<20	<20	<20
Nitrobenzene	ug/L	<20	<20	<20	<20
Isophorone	ug/L	<20	<20	<20	<20
2-Nitrophenol	ug/L	<20	<20	<20	<20
2,4-Dimethylphenol	ug/L	<20	<20	<20	<20
Benzoic acid	ug/L	<100	<100	<100	<100
Bis(2-chloroethoxy)methane	ug/L	<20	<20	<20	<20
2,4-Dichlorophenol	ug/L	<20	<20	<20	<20
1,2,4-Trichlorobenzene	ug/L	<20	<20	<20 ⋅	<20
Naphthalene	ug/L	<20	<20	<20	<20
4-Chloroaniline	ug/L	<20	<20	<20	<20
Hexachloro-1,3-butadiene	ug/L	<20	<20	<20	<20
p-Chloro-m-cresol	ug/L	<20	<20	<20	<20
2-Methylnaphthalene	ug/L	<20	<20	<20	<20
Hexachlorocyclopentadiene	ug/L	<20	<20	<20	<20
2,4,6-Trichlorophenol	ug/L	<20	<20	<20	<20
2,4,5-Trichlorophenol	ug/L	<100	<100	<100	<100
2-Chloronaphthalene	ug/L	<20	<20	<20	<20
2-Nitroaniline	ug/L	<100	<100	<100	<100
Dimethyl phthalate	ug/L	<20	<20	<20	<20
Acenaphthylene	ug/L	<20	<20	<20	<20
3-Nitroaniline	ug/L	<100	<100	<100	<100
Acenaphthene	ug/L	<20	<20	<20	<20
2,4-Dinitrophenol	ug/L	<100	<100	<100	<100
4-Nitrophenol	ug/L	<100	<100	<100	<100
Dibenzofuran	ug/L	<20	<20	<20	<20
2,4-Dinitrotoluene	ug/L	<20	<20	<20	<20
2,6-Dinitrotoluene	ug/L	<20	<20	<20	<20
Diethyl phthalate	ug/L	<20	<20	<20	<20
4-Chlorodiphenyl ether	ug/L	<20	<20	<20	<20
Fluorene	ug/L	<20	<20	<20	<20
4-Nitroaniline	ug/L	<100	<100	<100	<100

Table 1
Analytical Data for Ground Water
Former Amphenol Site, Franklin, IN
Units as Given

Location: Sample Identification:		GW-103EB 892901	MW-12 892902	MW-22 892904	MW-22Du 892906
Sample Date:		03/04/92	03/02/92	03/02/92	03/02/92
Semi-Volatiles	Units				
4,6-Dinitro-o-cresol	ug/L	<100	<100	<100	<100
n-Nitrosodiphenylamine	ug/L	<20	<20	<20	<20
4-Bromodiphenyl ether	ug/L	<20	<20	<20	<20
Hexachlorobenzene	ug/L	<20	<20	<20	<20
Pentachlorophenol	ug/L	<20	<20	<20	<20
Phenanthrene	ug/L	<20	<20	<20	<20
Anthracene	ug/L	<20	<20	<20	<20
Di-n-butyl phthalate	ug/L	<20	<20	<20	<20
Fluoranthene	ug/L	<20	<20	<20	<20
Pyrene	ug/L	<20	<20	<20	<20
Butyl benzyl phthalate	ug/L	<20	<20	<20	<20
3,3'-Dichlorobenzidine	ug/L	<40	<40	<40	<40
Benzo(a)anthracene	ug/L	<20	<20	<20	<20
Bis(2-ethyl hexyl)phthalate	ug/L	<20	<20	<20	<20
Chrysene	ug/L	<20	<20	<20	<20
Di-n-octyl phthalate	ug/L	<20	<20	<20	<20
Benzo(b)fluoranthene	ug/L	<20	<20	<20	<20
Benzo(k)fluoranthene	ug/L	<20	<20	<20	<20
Benzo(a)pyrene	ug/L	<20	<20	<20	<20
Indeno(1,2,3-cd)pyrene	ug/L	<20	<20	<20	<20
Dibenz(a,h)anthracene	ug/L	<20	<20	<20	<20
Benzo(ghi)perylene	ug/L	<20	<20	<20	<20
Parathion	ug/L	<40	<40	<40	<40
Ethyl methanesulfonate	ug/L	<20	<20	<20	<20
p-Phenylenediamine	ug/L	<20	<20	<20	<20
n-Nitrosodiethylamine	ug/L	<20	<20	<20	<20
n-Nitrosomethylethylamine	ug/L	<20	<20	<20	<20
n-Nitrosodi-n-butylamine	ug/L	<20	<20	<20	<20
n-Nitrosopiperidine	ug/L	<20	<20	<20	<20
5-Nitro-o-toluidine	ug/L	<20	<20	<20	<20
4-Dimethylaminoazobenzene	ug/L	<20	<20	<20	<20
Methyl parathion	ug/L	< 0.03	< 0.033	<0.03	<0.03
Safrole	ug/L	<40	<40	<40	<40
Isosafrole	ug/L	<40	<40	<40	<40
2-Picoline	ug/L	<20	<20	<20	<20
Phenacetin	ug/L	<20	<20	<20	<20
2-Toluidine	ug/L	<20	<20	<20	<20
3,3'-Dimethylbenzidine	ug/L	<100	<100	<100	<100
m-Dinitrobenzene	ug/L	<20	<20	<20	<20
a,a-Dimethylphenthylamine	ug/L	<20	<20	<20	<20
O,O,O-Triethyl phosphorothioate	ug/L	<20	<20	<20	<20
Methapyrilene	ug/L	<40	<40	<40	<40
Diallate	ug/L	<40	<40	<40	<40

Table 1
Analytical Data for Ground Water
Former Amphenol Site, Franklin, IN
Units as Given

Location:		GW-103EB	MW-12	MW-22	MW-22Dur
Sample Identification:	892901	892902	892904	892906	
Sample Date:	03/04/92	03/02/92	03/02/92	03/02/92	
Semi-Volatiles	Units				FO RESERVE
1,3,5-Trinitrobenzene	ug/L	<200	<200	<200	<200
Famphur	ug/L	<20	<20	<20	<20
4-Nitroquinoline-1-oxide	ug/L	<200	<200	<200	<200
1,2,4,5-Tetrachlorobenzene	ug/L	<20	<20	<20	<20
Pentachloronitrobenzene	ug/L	<20	<20	<20	<20
Phorate	ug/L	<0.15	< 0.16	<0.15	<0.15
7,12-Dimethylbenz(a)anthracene	ug/L	<20	<20	<20	<20
n-Nitrosodimethylamine	ug/L	<20	<20	<20	<20
2,4,5,6-Tetrachlorophenol	ug/L	<20	<20	<20	<20
Chlorobenzilate	ug/L	<20	<20	<20	<20
Thionazin	ug/L	<40	<40	<40	<40
Disulfoton	ug/L	<0.2	< 0.22	<0.2	<0.2
Isodrin	ug/L	<200	<200	<200	<200
n-Nitrosomorpholine	ug/L	<20	<20	<20	<20
Pentachlorobenzene	ug/L	<20	<20	<20	<20
4-Aminobiphenyl	ug/L	<20	<20	<20	<20
Hexachloropropene	ug/L	<20	<20	<20	<20
2,6-Dichlorophenol	ug/L	<20	<20	<20	<20
Sulfotepp	ug/L	<20	<20	<20	<20
Methyl methanesulfonate	ug/L	<20	<20	<20	<20
1,4-Naphthoquinone	ug/L	<20	<20	<20	<20
n-Nitrosopyrrolidine	ug/L	<20	<20	<20	<20
Acetophenone	ug/L	<20	<20	<20	<20
Dimethoate	ug/L	<20	<20	<20	<20
3-Methylcholanthrene	ug/L	<20	<20	<20	<20
2-Acetylaminofluorene	ug/L	· <20	<20	<20	<20
Aniline	ug/L	<100	<100	<100	<100
1,2-Dibromo-3-chloropropane	ug/L	<20	<20	<20	. <20
Hexachlorophene	ug/L	<20	<20	<20	<20
Kepone	ug/L	<100	<100	<100	<100
1-Naphthylamine	ug/L	<20	<20	<20	<20
2-Naphthylamine	ug/L	<20	<20	<20	<20
Pronamide	ug/L	<100	<100	<100	<100
Aramite	ug/L	<200	<200	<200	<200

Table 1
Analytical Data for Ground Water
Former Amphenol Site, Franklin, IN
Units as Given

Location: Sample Identification	GW-103EB 892901	MW-12 892902	MW-22 892904	MW-22Dup 892906	
Sample Date:		03/04/92	03/02/92	03/02/92	03/02/92
Pesticides	Units		05/02/2	03/02/2	03/02/2
Azinphos-methyl	ug/L	<1.5	<1.6	<1.5	<1.5
Bolstar	ug/L	<0.15	<0.16	<0.15	<0.15
Chlorpyrifos	ug/L	<0.3	<0.33	<0.3	<0.3
Coumaphos	ug/L	<1.5	<1.6	<1.5	<1.5
Demeton-S	ug/L	<0.25	<0.27	<0.25	<0.25
Diazinon	ug/L	<0.6	<0.66	<0.6	<0.6
Dichlorvos	ug/L	<0.1	<0.11	<0.1	<0.1
Disulfoton	ug/L	<0.2	<0.22	<0.2	<0.2
Ethoprop	ug/L	<0.25	<0.27	<0.25	<0.25
Fensulfothion	ug/L	<1.5	<1.6	<1.5	<1.5
Fenthion	ug/L	<0.1	<0.11	<0.1	<0.1
Merphos	ug/L	<0.25	<0.27	<0.25	<0.25
Mevinphos	ug/L	<0.3	<0.33	<0.3	<0.3
Naled	ug/L	<0.1	<0.11	<0.1	<0.1
Methyl parathion	ug/L	<0.03	< 0.033	< 0.03	<0.03
Malathion	ug/L	<0.5	<0.55	<0.5	<0.5
Phorate	ug/L	<0.15	<0.16	<0.15	<0.15
Ronnel	ug/L	<0.3	<0.33	<0.3	<0.3
Stirofos	ug/L	<5	<5.5	<5	5
PCB: aroclor 1016	ug/L	<1	<1	<1	<1
PCB: aroclor 1221	ug/L	<1	· <1	<1	<1
PCB: aroclor 1232	ug/L	<1	<1	<1	<1
PCB: aroclor 1242	ug/L	<1	<1	<1	<1
PCB: aroclor 1248	ug/L	<1	<1	<1	<1
PCB: aroclor 1254	ug/L	2	2	<2	2
PCB: aroclor 1260	ug/L	2	2	2	2
TCDD, total	ug/L	< 0.0031	< 0.0006	< 0.0018	<0.0014
Penta CDD, total	ug/L	< 0.0045	< 0.0007	< 0.0022	<0.0008
Hexa CDD, total	ug/L	< 0.0013	<0.0028	< 0.0017	<0.0015
Hepta CDD, total	ug/L	< 0.0058	< 0.003	< 0.0025	< 0.0029
Octa CDD, total	ug/L	< 0.0063	< 0.0079	< 0.0055	<0.0048
Tetra CDF, total	ug/L	< 0.0006	< 0.0002	< 0.0014	< 0.0015
Penta CDF, total	ug/L	< 0.0018	< 0.0013	< 0.0014	<0.0004
Hexa CDF, total	ug/L	<0.0018	< 0.0006	< 0.0012	< 0.0017
Hepta CDF, total	ug/L	< 0.0021	< 0.0008	< 0.0014	<0.0015
Octa CDF, total	ug/L	< 0.0059	< 0.0056	< 0.0032	< 0.0025
2,4-D	ug/L	<1.8	<1.8	<1.8	<1.8
2,4,5-T	ug/L	<0.3	<0.3	<0.3	<0.3
Silvex (2,4,5-TP)	ug/L	<0.3	<0.3	<0.3	<0.3
2-sec-Butyl-4,6-dinitro-phenol	ug/L	<0.3	<0.3	<0.3	<0.3

Table 1
Analytical Data for Ground Water
Former Amphenol Site, Franklin, IN
Units as Given

Location: Sample Identification Sample Date:	<u>.</u>	GWIT-1A 894311 03/05/92	GWIT-1A 896002 03/06/92	GWIT-2 894313 03/05/92	GWIT-2 896001 03/06/92	GWIT-3 894301 03/05/92	MW-03 892911 03/02/92	MW-09 894304 03/05/92	MW-12 892902 03/02/92	MW-12Dis 892903 03/02/92	MW-20 894307 03/05/92	MW-21Dup 894308 03/05/92
Inorganics	Units											
Aluminum	ug/L	484		6020		11000	4860	8610			5710	101 B
Antimony	ug/L	17 UN		17 UN		17 UN	17 U	17 UN	<60	<60	17 UN	17 UN
Arsenic	ug/L	77 N		6 UN		6 UNWM	3.3 B	6 UN	<10	<10	6 UN	6 UN
Barium	ug/L	114 B		694		423	269	270	559	101	380	528
Beryllium	ug/L	1 U		1.1 B		1.8 B	1 U	1.4 B	<5	<5	1.1 B	1 U
Cadmium	ug/L	2 U		2 U	W 8 1	2 U	2 U	2 U	<5	<5	2 U	2 U
Calcium	ug/L	63000		394000		567000	340000	525000			612000	1170000
Chromium	ug/L	4 U		16.9		32.8	15.6	27	24.7	<5	20.1	87.3
Cobalt	ug/L	4 U		15.3 B		34.4 B	8 B	15.6 B	80.4	<10	12.5 B	11 B
Copper	ug/L	6 U		76.7		94.9	90.6	72.7	160	<10	67.4	18.1 B
Iron	ug/L	2920		21200		28400	8790	16700	TO THE		13200	407
Lead	ug/L	2.7 B*		41.7 S*		79 *	29.5 S	58.5 *	623.4	9.08	40.8 *	4.6 *
Magnesium	ug/L	30800		123000		187000	65700	158000		1	232000	323000
Manganese	ug/L	202		1730	19 10	2800	982	1030		A THE A	2840	2440
Mercury	ug/L	0.2 U		0.2	<b>7.1</b> 5.1	0.3	0.26	0.38	0.49	<0.2	0.34	0.45
Nickel	ug/L	11.3 B		50.1		64.6	58.8	47.6	118	<10	40.9	122
Potassium	ug/L	1830 B		3610 B		3510 B	3540 B	3840 B			4590 B	3520 B
Selenium	ug/L	3 U		3 U		5.3	3.4 B	4.3 B	7.75	<5	3 U	25.9 SM
Silver	ug/L	2 U		2 U		2 U	12.1	2 U	<10	<10	2 U	2 U
Sodium	ug/L	34800		20900		7390	8790	9530			10300	7530
Sulfide, total	ug/L			189			20-4					
Thallium	ug/L	2 UN	5 5 5 6	2 UN		2 UN	2 U	2 UN	<10	<10	2 UN	2 UN
Tin	ug/L								<50	511		100
Vanadium	ug/L	4 U		23 B		36.9 B	20 B	42.1 B	28.9	<10	35.4 B	89
Zinc	ug/L	9.2 BE		110 E	10.15	177 E	94.4 E	198 E	345	11.9	1080 E	5.3 BE
Cyanide	ug/L				200	10 U	10 U	10 U			10 U	10 U
Cyanide, amenable	ug/L		<10		<10	<10	<10	<10			<10	<10

Table 1
Analytical Data for Ground Water
Former Amphenol Site, Franklin, IN
Units as Given

Location: Sample Identification Sample Date:	i i	MW-21 894309 03/05/92	MW-21 896003 03/06/92	MW-22 892904 03/02/92	MW-22Dis 892905 03/02/92	MW-22Dup 892906 03/02/92	MW-23Dup 894302 03/05/92	MW-23 894303 03/05/92	MW-24 892909 03/02/92	MW-25 897901 03/11/92	MW-26 894312 03/05/92	MW-26 934301 04/16/92
Inorganics	Units											
Aluminum	ug/L	8500					14700	15800	15600	700	6020	
Antimony	ug/L	17 UN		<60	<60		17 UN	17 UN	17 U	16 U	17 UN	
Arsenic	ug/L	6 UN		<10	<10		7.4 BN	7.6 BN	4.4 B	6 U	6 UN	a contract
Barium	ug/L	472		307	82.4		473	500	505	64.2 B	223	
Beryllium	ug/L	2.6 B		<5	<5		1.9 B	2.1 B	2.3 B	1 U	1 U	
Cadmium	ug/L	2.5 B	2 4	<5	<5	1.300	2 U	2 U	2 U	2 U	2 U	
Calcium	ug/L	1000000	1 1 4				169000	193000	774000	60000	345000	
Chromium	ug/L	58.5	13.14	36.5	<5		25.6	28.4	37.1	3 U	23.2	-
Cobalt	ug/L	75		34.3	<10	and the same	11.8 B	13.6 B	23.1 B	6 U	11 B	
Copper	ug/L	510		234	<10		121	130	142	4 U	47.4	
ron	ug/L	7670					23100	26000	18100	1220	16900	
Lead	ug/L	162 *		68.42	<3		95.7 *	69.3 *	89.4 W	4.3 W	32.4 S*	
Magnesium	ug/L	342000	No. of Street, or	San Sileto		in the same	63200	73300	178000	26600	114000	- the same of
Manganese	ug/L	3520					2900	3250	2170	357	1020	
Mercury	ug/L	0.35		0.26	<0.2		0.2 U	0.2 U	0.67	0.2 U	0.23	
Nickel	ug/L	538		92.9	<10		34.6 B	41.7	65.2	8 U	43.4	
Potassium	ug/L	3570 B					2880 B	2870 B	5530	2250 B	7010	Port and wi
Selenium	ug/L	7.5		<5	<5		3 U	3 U	4.9 BS	2 U	3 UW	
Silver	ug/L	46.7		62.2	<10		2 U	2 U	2 U	1 U	2 U	
Sodium	ug/L	6530					30900	31200	5840	25700	10000	
Sulfide, total	ug/L				4 44 24	<1000						
Thallium	ug/L	2 UN		<10	<10		2 UN	2 UN	2 U	2 U	2 UN	
Tin	ug/L			<50	<50		Tay of the first					100
Vanadium	ug/L	63.8		70.5	<10		35.7 B	37 B	53.8	6 U	22.7 B	
Zinc	ug/L	256 E		236	<10		234 E	261 E	224 E	17.2 B	89.9 E	
Cyanide	ug/L		100				10 U	10 U	10 U	10 U		
Cyanide, amenable	ug/L		<10	La			<10	<10	<10	<10		<10

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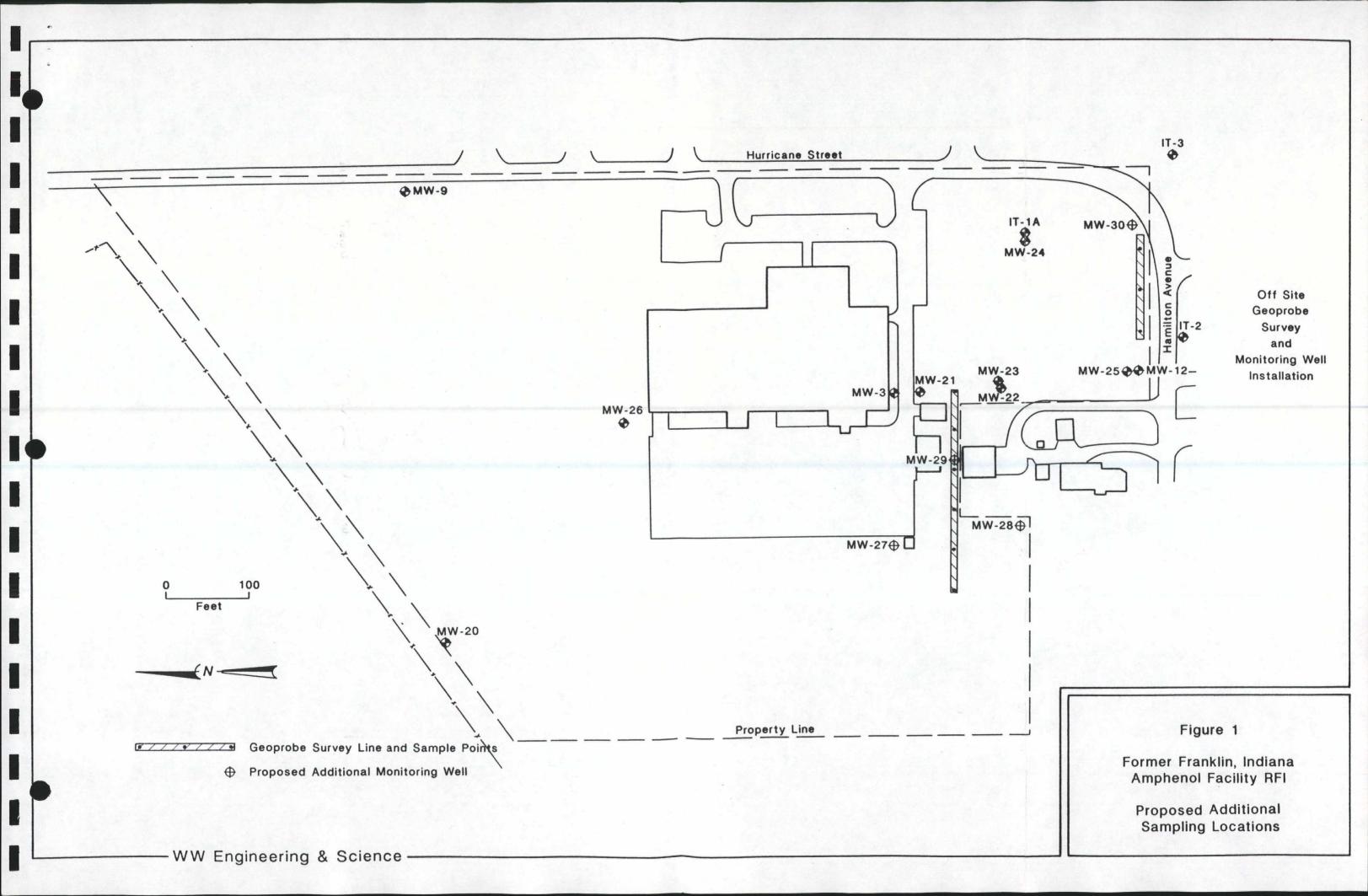
# Table 1 Analytical Data for Ground Water Former Amphenol Site, Franklin, IN Units as Given

#### Footnotes:

- U = Chemical not detected at specified detection limit.
- \* = Duplicate analysis was not within control limits.
- B = Reported value is below Contract Required Detection Limit (DL) but above instrument DL.
- E = Value is estimated due to matrix spike interferences.
- M = Duplicate injection precision criteria not met.
- N = Spiked sample recovery not within control limits.
- S = Reported value was determined by the Method of Standard Additions (MSA).
- W = Post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is <50% of spike absorbance.

TABLE 2 - Sampling and Analysis Summary

Matrix	No. of Samples	Analysis/Container	No. Blanks Eapt./Trip	No. Duplicates	No. MS/D	Preservative	Holding <u>Time</u>
Maria	Danipieo		Z-1p m z-1p				
<b>Ground Water</b>							
Geoprobe	30 (est.)	PCE, TCE, 1,1,1-TCA, 1,1-DCA/ 40 ml VOA vials with TFE septa	3/0	3		None	Immediate Analysis
Monitoring Well	10 (est.)	VOC/2-40 ml VOA vials with TFE septa	1/1	1	2	HCl ph<2; Cool 4°C	14 days
	10 (est.)	Metals/1 L poly bottle nonfiltered	1/0	1	-	HNO <sub>3</sub> ph<2; Cool 4°C	6 months; Hg - 26 days
	2	Metals/1 L poly bottle filtered	-	•		HNO <sub>3</sub> pH<2; Cool 4°C	6 months; Hg - 26 days
	10 (est.)	Total/Amenable CN/1 L glass bottle	1/0	1	- 1	NaOH pH<12; Cool 4°C	14 days
Surface Water	1	VOC/2-40 ml VOA vials with TFE Septa	1/1	1	2	HCl ph<2; Cool 4°C	14 days
	1	Metals/1 L poly bottle	1/0	1		HNO <sub>3</sub> ph<2; Cool 4°C	6 months Hg - 26 days
	1	Total/Amenable CN/ 1 L glass bottle	1/0	1		NaOH pH>12; Cool 4°C	14 days
Soil Borings	2	VOC/2-40 ml widemouth	1/0	1	-	Cool 4°C	14 days
	2	vials with TFE Septa Metals; Total/Amenable CN/ glass bottlewith TFE lined ca		1	-	Cool 4°C	6 months metals 14 days CN



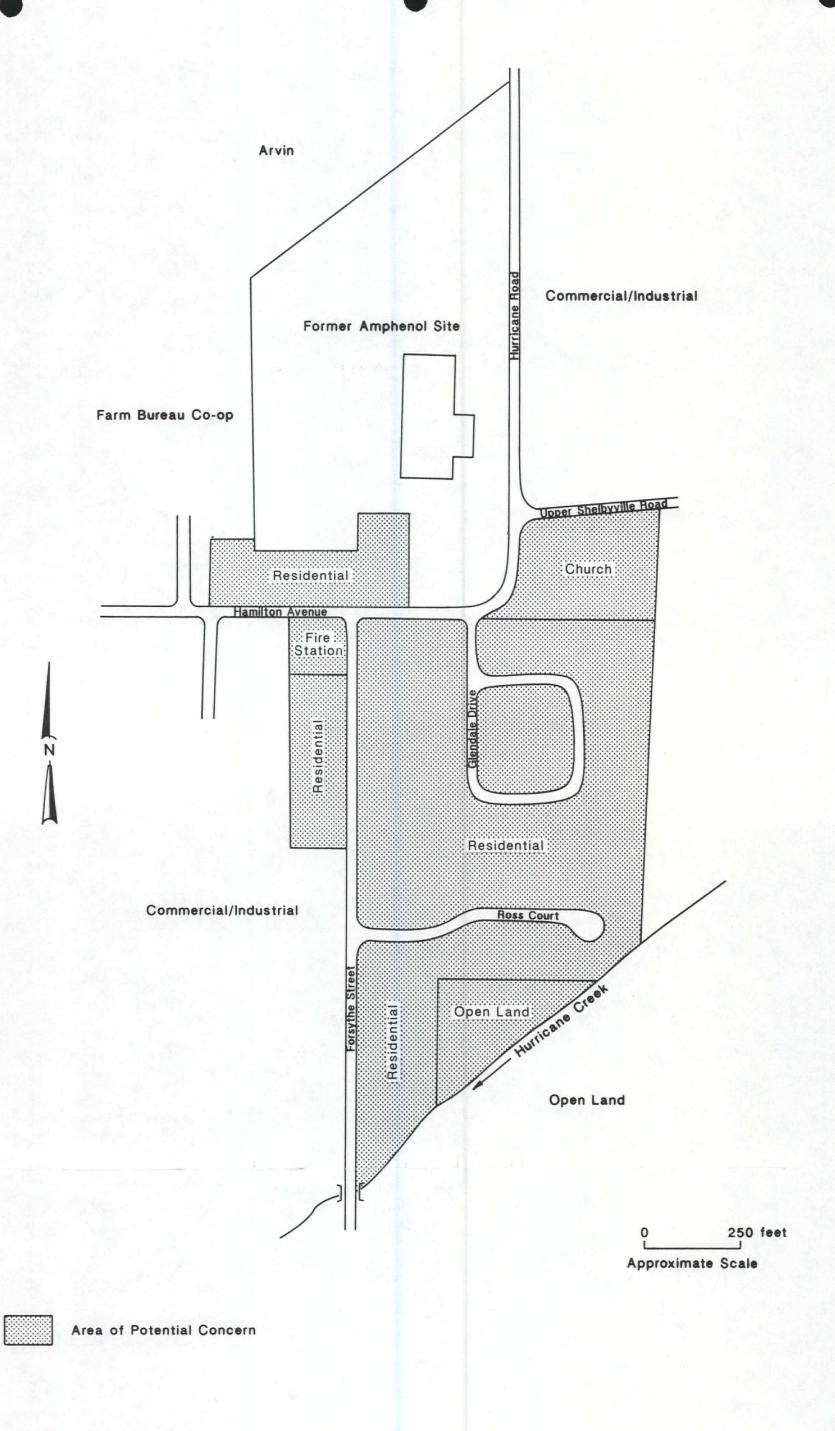


Figure 2. Land use and area of potential concern in the vicinity of the former Amphenol site.

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# TECHNICAL MEMORANDUM DRAFT

TO: Mik

Mike Jarvis, President Franklin Power Products 400 Forsythe Street

Franklin, Indiana 46131

FROM:

James H. Keith, Project Manager

WW Engineering & Science 5010 Stone Mill Road

Bloomington, Indiana 47408

RE:

Preliminary Results of Plume Delineation in the Upper Aquifer (Unit B) at

the Former Amphenol Facility at 980 Hurricane Road, Franklin, Indiana

DATE:

June 23, 1992

#### BACKGROUND

In accordance with Section VII.2.a.(4)(c) of the U.S. EPA Administrative Order on Consent (CO) dated November 27, 1990, a draft report summarizing the results of the initial plume delineation shall be submitted within 30 days of receipt of analytical data for ground water samples collected in accordance with the CO and the IT Work Plan for the Former Amphenol RFI. The basis for this Technical Memorandum is also described in Section 3.7 - "RFI Decision Points" in Volume I of Interim Final RCRA Facility Investigation (RFI) Guidance - Volume I and II (OSWER Directive 9502.00-6D) as follows: "As monitoring data become available, both within and at the conclusion of discrete investigative phases, they should be reported to the regulatory agency as directed. The regulatory agency will compare the monitoring data to applicable health and environmental criteria to determine the need for (1) interim corrective measures; and (2) a CMS. In addition, the regulatory agency will evaluate the monitoring data with respect to adequacy and completeness to determine the need for any additional monitoring efforts."

This draft Technical Memorandum describes the samples collected, sampling methods and analytical parameters for ground water. Also included are the findings of a soil gas survey submitted to U.S. EPA as a draft Technical Memorandum on April 8, 1992. The

Grand Rapids, MI Livonia, MI Bloomington, IN Columbus, OH Allen Park, MI Canton, OH Lapeer, MI Chattanooga, TN

survey submitted to U.S. EPA as a draft Technical Memorandum on April 8, 1992. The sufficiency of the existing data to describe a ground water plume in the upper aquifer at the Former Amphenol facility is discussed. No plume was delineated for the lower aquifer at the site, but the possibility for vertical migration of contaminants from the Unit B aquifer is discussed. Only aspects of the RFI study that pertain directly to plume delineation are discussed in this Technical Memorandum.

#### SAMPLING LOCATIONS, METHODS AND PARAMETERS

Ground water samples were collected from six existing ground water monitoring wells (IT-1A, IT-2, IT-3, MW-3, MW-9 and MW-12), and from seven ground water monitoring wells installed by WW Engineering & Science (WWES) for this RFI. Well locations are shown on Sheet 1 - Topographic Map. Site geology is shown on the Cross Sections in Sheet 2. Four geologic units (Units A to D) have been identified.

Prior to the RFI field work, horizontal and vertical ground controls were established. Temporary bench marks (TBMs) were established on two of the new sanitary sewer manhole rims, and all site elevations are based upon these TBMs.

Monitoring wells were constructed in accordance with the <u>RCRA Ground Water</u> Monitoring Technical Enforcement Guidance Document (OSWER 9950.1 Sept., 1986), as detailed in the 1988 IT Work Plan, with the following exceptions:

- No water was used in the installation of the filter-pack sand.
- Laboratory-grade deionized water was added to the well pipe as required to counteract the buoyant force of well fluids, and to clean fine soil particles from the well screen.
- Where installation of the bentonite seal was made above the saturated zone, three gallons of laboratory-grade deionized water were added to the borehole to hydrate the pellets.

Wells 20, 21, 22, 24 and 26 are completed in the upper sand and gravel unit (Unit B). Wells 23 and 25 are completed in the lower sand unit at approximately 60 foot depth, herein referred to as Unit D. The new monitoring well installation resulted in three

paired shallow sand/deep sand installations where hydraulic gradients and levels of contaminants could be compared vertically between the two units. These installations consisted of MW-22/23, MW-12/25 and MW-24/IT-1A.

Wells 23 and 25 were installed utilizing a double well casing to limit the potential for cross contamination between the shallow and deep sand units. The following procedure was utilized. A hole was augered through the shallow sand unit and into the top of the underlying glacial till. A large diameter casing was then inserted in the hole, and cemented inside and out to the surface. After the cement had set a minimum of 24 hours, the cement inside the casing was drilled out, and the boring was advanced to the Bottom of Unit D utilizing hollow stem auger drilling techniques through the surface casing.

Monitoring wells MW-12, IT-1A, IT-2, IT-3 and MW-22 through 25 served to investigate conditions around the old sanitary sewer line and the downgradient portion of the site. Monitoring wells MW-21 and MW-3 provided ground water samples from the vicinity of the former plating room and RCRA storage area. Monitoring wells MW-9, MW-20 and MW-26 were utilized as upgradient sampling points.

New monitoring wells MW-20 through MW-26, as well as existing monitoring wells MW-3, MW-9 and MW-12, previously installed by ATEC, and monitoring wells IT-1A, IT-2 and IT-3, installed previously by IT were sampled. Prior to sampling, each well was developed by bailer surging to remove fines from the well screen area. Approximately ten-well volumes were removed from most shallow wells, but low yield prevented this volume of purging in wells 12, 20 and IT-2. Deep wells 23, 25 and IT-1A were purged of three casing volumes. A large steel treble hook, cotton string, and a group of lead sinkers were removed from MW-12. These are presumed to have been lost at some point in the past, possibly from a previous attempt to retrieve lost sampling equipment.

Analytical parameters for ground water included volatile organic compounds (VOCs), metals, and total and amenable cyanide. Samples for metals were collected unfiltered. Existing monitoring wells MW-12 and WWES monitoring well MW-22 were analyzed for Appendix IX constituents in accordance with Section VII.2.a.(4)(c)(ii) of the CO, and samples for metals analysis were collected both filtered and unfiltered.

A soil vapor survey was performed as a part of the RFI study, and a draft Technical Memorandum was submitted to U.S. EPA on April 8, 1992. Results and

recommendations of this survey, as they pertain to a ground water plume, are briefly discussed in the section on results.

#### RESULTS AND DISCUSSION

Summary monitoring well data including location, top of casing and ground elevation, screened intervals, and measured water levels are given in Table 1. Analytical results for ground water are given in Table 2. A potentiometric surface map is shown in Figure 1, and a ground water plume delineation map is shown in Figure 2. Monitoring wells were sampled for ground water between March 2, 1992 and March 10, 1992. Unvalidated analytical results were received then sent to the WWES Grand Rapids office for data validation. Validation results were received on May 26, 1992.

#### Soil Vapor Survey

Two separate compounds were identified in soil gas: tetrachloroethylene (PCE) and trichloroethylene (TCE). When soil gas concentrations at sampling points were plotted, distinct distributions were defined for each compound.

The pattern of concentrations for PCE suggested a point contamination source at an old concrete pad at the southwest corner of the back facility parking lot. The PCE soil gas plume had a distinct northwest-southeast direction which corresponds with the potentiometric surface in that part of the site (Figure 1). The pattern of concentrations for TCE had a peak in the vicinity of the point where a storm sewer crosses beneath the old sanitary sewer line, and at a point where sewer inspection reports indicated a break in the old sanitary sewer line. Peak soil gas values for TCE tended to parallel the sanitary sewer line, fall off rapidly to the west, and extend southeasterly.

#### **Ground Water Ouality**

The analytical results in Table 2 indicate that for the most part, metals would not be expected to be a significant component of any contaminant plume that may be present. Likewise, total or amenable cyanide does not appear in significant concentrations in the ground water and would not be expected to be a significant plume component.

For Appendix IX compounds in MW-12 and MW-22, there were no detects for parameter groups other than metals and VOCs.

Of the VOCs detected in the ground water, we consider the three compounds present in the highest concentrations and present in the greatest number of samples to be most indicative of the plume: TCE, PCE and 1,1,1-Trichloroethane (TCA). All three compounds are denser than water. For the purposes of this report, a summed VOC value in ground water for the three compounds will be used to describe the plume. In cases where compounds are below detection limits, a value of one-half the detection limit is used in the summation.

Combined VOC values are highest for MW-22 (20,191 ug/l), followed by MW-12 (8,153 ug/l). Both are located along the abandoned sanitary sewer line. Two samples collected of ground water south of the storm sewer at IT-2 and IT-3 have values of 45.5 ug/l and 64.5 ug/l, respectively. The three upgradient monitoring wells MW-9, MW-20 and MW-26 have values of 13.5 ug/l, 7.5 ug/l (no detects) and 10.5 ug/l, respectively.

MW-3, located at the south side of the old plating room, had the next highest value at 245 ug/l). The MW-3 sample is assumed not to be directly associated with values along the old sewer line. There was once contamination (since removed) beneath the floor of the plating room, and the values for PCE and TCE in MW-3, once equal to those of MW-12, are now reduced far below values both for MW-3 in the past (see 1986 quarterly monitoring results, Table 3 of IT Work Pan) and MW-12 in the present (Table 2).

#### Plume Delineation

The potentiometric surface map shown in Figure 1 indicates that ground water flow in the southern portion of the site trends generally northwest-southeast. The ground water flow data do not suggest that the storm sewer is at this time influencing ground water flow. In Sheet 2 (line B-C-D), it can be seen that during sampling for this study, the ground water surface was slightly below the bottom of the storm sewer. Sheet 2 also indicates that the Unit B sand is much thinner in the vicinity of the sewer line it is not known whether this unit continues to thin to the south, but any further thinning may influence plume movement in this direction.

Figure 2 shows ground water isoconcentration lines for the summed VOC values. The largest summed values appear to be centered along the old sanitary sewer line, and higher values appear to run east along the storm sewer line. For reasons previously explained, we believe that VOCs at MW-3 are not directly related to the values in the vicinity of the sanitary sewer line, and that the plating room may have been a separate source of contamination. The VOC value at MW-3 is isolated from the rest by a closed isoconcentration line.

Two of the three upgradient monitoring wells (MW-9 and MW-26) have positive results for at least one of the compounds, but the results are at or near the detection levels for all compounds. MW-9, installed by ATEC in 1984, has a history of positive results for PCE, TCA and TCE (see 1986 quarterly monitoring results, Table 3 of the IT Work Plan), but the values have diminished for all three compounds in the intervening period. Based upon the comparisons of current analytical data and the 1986 results, and IT comments regarding deficiencies in ATEC well construction at this site, we conclude that it is likely that the values for PCE, TCA and TCE at MW-9 are the result of cross contamination at that time. This is indicated by a closed isoconcentration line around the well.

Because of the low levels of PCE, TCA and TCE in the upgradient monitoring wells, and remaining questions about the adequacy of MW-9, it is likely that the plume boundary will have to based upon detection limits rather that upgradient ground water contaminant values.

Wells IT-2 and IT-3, located south of the storm sewer line, have concentrations well above detection limits for both TCE and TCA. These are the most downgradient wells used for this project, and it is apparent that significant concentrations of TCE and TCA are present in the ground water off site. It appears that at least during periods of low ground water levels, the storm sewer does not intercept the ground water plume. Well IT-2 and IT-3 data suggest that contaminants may migrate both beneath and along the storm sewer alignment. Based upon these results, it is apparent that a ground water plume extends off site to the south, but cannot totally be delineated to background or upgradient levels.

By comparing individual values for contaminants in Figure 2, it can be seen that PCE is present at its highest levels at MW-22 and MW-12. PCE is not present off site at IT-2 and IT-3. This suggests a source and pattern of PCE contamination that is separate from a TCA/TCE source and movement pattern, and is further suggested by the data gathered from the soil gas survey that indicates a PCE soil gas plume at the southwest parking lot corner and a TCE plume centered on the old sanitary sewer line (TCA was not identified as one of the soil gases present).

Comparison of Unit B/Unit D water levels from paired wells indicates a significant downward hydraulic gradient between the two zones, and suggests the potential for downward migration of contaminants (Table 1). Table 2 indicates that PCE and TCE were detected well above detection limits in all three Unit D monitoring wells, and 1986 quarterly monitoring data (Table 3 in the IT Work Plan) indicate the presence of 1,1-Dichloroethane, 1,2-Dichloroethane, PCE, 1,2-Dichloroethylene, TCA, TCE, acetone, chloroform, methylene chloride and styrene in IT-1A. In each case, however, the deeper wells were installed through the Unit B sand units containing orders of magnitude higher contaminants levels. Despite the use of a well casing through Unit B, some cross contamination may have occurred during well construction. The possibility of Unit D contamination from two sources needs to be evaluated:

- Downward migration along the well bore during construction
- Downward migration of contaminants through the confining layer separating Units B and D.

In addition, it remains to be determined if deeper water-bearing zones have been contaminated.

#### CONCLUSIONS

- A soil gas survey conducted at the Former Amphenol site indicates two separate soil gas plumes on site: A TCE plume centered near the crossing of the old sanitary sewer line and the storm sewer, and a PCE plume centered near an old concrete pad at the southwest corner of the facility parking lot. The TCE plume appears to follow the trend of the old sewer line and the PCE plume has a well-defined northwest-southeast direction from the old concrete pad.
- 2) The major components of the plume are determined to be TCE, PCE and TCA. All three compounds are denser than water.
- A ground water plume defined by the summed values of the major plume components has its highest values along the old sanitary sewer line. The plume appears to extend southerly and off the site, and easterly along the storm sewer line. The values at MW-3 adjacent to the plating room are assumed to be attributed to former plating room contamination, and not directly related to the rest of the plume.
- 4) During ground water sampling for the Former Amphenol RFI, the ground water surface was beneath the bottom of the storm sewer, which has been described as acting as a ground water intercept.
- 5) Geologic cross sections of the site indicate a thinning of Unit B at the south end. It is not known if this thinning continues further south.
- There are some positive values for the plume components in upgradient wells, but these are at or near detection limits. Positive values at MW-9 may be due to residual contamination from faulty well construction. Detection limits would be the most appropriate means to delineate the plume.
- 7) The ground water plume cannot be delineated with the information available.

- A comparison of individual component values indicates that PCE is present along the sanitary sewer line but not south of the storm sewer line or in the easterly extension of the plume along the storm sewer line. When the soil gas data are considered as well, a separate source for PCE is indicated.
- 8) There is a definite downward hydraulic gradient between Units B and D and evidence of contaminants in Unit D. The source of the contamination to Unit D has not been completely evaluated.

#### RECOMMENDATIONS

In order to more completely describe the ground water plume present at the Former Amphenol facility, ground water pathways, and plume boundaries, the following additional information needs to be gathered for the RFI:

- 1) Evaluation of a potential separate PCE ground water plume at the southwest corner of the facility parking lot.
- 2) Additional sampling points to delineate the plume boundary in Unit B south of the storm sewer (off site).
- 3) Evaluation of the storm sewer and storm sewer trench as a possible pathway for contaminant migration, and delineation of any plume extension along the storm sewer.
- 4) Evaluation of ground water flow patterns and contaminants in storm sewer water during periods when ground water levels are above the bottom of the storm sewer.
- 5) Evaluation of possible sources of contamination to Unit D, perhaps utilizing additional well purging and sample analysis.
- 6) Evaluation of Unit B thickness south of the site.

Table 1. Monitoring Well Completion and Water Level Data

6. 6.384	IN	STALLED	LOCATION		ELEVATION (feet M.S.L.)							штно-
WELL	BY	DATE	N	E	T.O.C.	GROUND	SCREEN	SCREEN	WATER	WATER	NOTES	STRATIGRAPHIC
NO			(feet)	(feet)			TOP	воттом	03/25	06/02	100	UNIT
MW-1	ATEC	09-Feb-84	NA	NA	734.4	734.4	714.4	704.4	NA	NA	D	
MW-2	ATEC	09-Feb-84	NA	NA	734.4	734.7	714.7	704.7	NA	NA	D	
MW-3	ATEC	08-Feb-84	241	-244	736.44	735.3	715.8	705.8	719.47	720.40		В
MW-4	ATEC	13-Feb-84	NA	NA	733.5	731.3	711.8	701.8	NA	NA	D	
MW-5	ATEC	14-Feb-84	NA	NA	736.4	734.3	714.3	704.3	NA	NA	D	Water Street
MW-6	ATEC	26-Jun-84	NA	NA	NA	732.7	714.0	709.2	NA	NA	D	Am Program
MW-7	ATEC	26-Jun-84	NA	NA	NA	730.1	712.1	707.1	NA	NA	D	
MW-8	ATEC	27-Jun-84	NA	NA	NA	731.1	715.6	710.6	NA	NA	D	
MW-9	ATEC	03-Jul-84	852	5	733.04	730.5	713.5	708.5	720.28	721.57		В
MW-10	ATEC	03-Jul-84	NA	NA	NA	734.1	716.1	711.1	NA	NA	D	
MW-11	ATEC	05-Jul-84	NA	NA	NA	731.9	717.9	712.9	NA	NA	D	
MW-12	ATEC	05-Jul-84	-51	-215	736.38	733.8	716.3	711.3	718.99	719.62		В
MW-13	ATEC	19-Jun-84	NA	NA	NA	734.7	558.7	553.7	NA	NA	D	
MW-14	ATEC	06-Jul-84	NA	NA	NA	734.7	621.7	616.7	NA	NA	D	
MW-15	ATEC	05-Jul-84	NA	NA	NA	734.7	678.7	673.7	NA	NA	D	
MW-16	ATEC	05-Jul-84	NA	NA	NA	734.7	721.2	711.2	NA	NA	D	
MW-17	ATEC	10-Jul-84	NA	NA	NA	734.6	714.6	709.6	NA	NA	D	
IT-1A	IT	Apr-85	83	-46	736.38	733.9	683.9	673.9	718.27	717.47		D
IT-1B	П	Apr-85	NA	NA	736.73	734.5	725.6	715.5	NA	NA	D	WE THE T
IT-2-	П	Apr-85	-116	-117	728.71	732.4	724.5	714.4	718.95	719.52	de la	В
IT-3	П	Apr-85	-105	52	728.71	728.9	723.0	7129	718.45	718.69	BATTE.	В
IT-4	П	Apr-85	NA	NA	731.73	728.9	718.9	713.9	NA	NA	U	
IT-5	IT	Apr-85	NA	NA	735.82	732.9	680.6	670.9	NA	NA	U	
MW-20	WWES	05-Feb-92	856	-558	734.03	731.8	719.7	710.4	721.14	722.52		В
MW-21	WWES	20-Feb-92	210	-244	737.91	735.1	720.2	710.8	719.44	720.31		В
MW-22	WWES	11-Feb-92	109	-237	737.64	735.0	723.4	714.0	719.25	720.08		В
MW-23	WWES	17-Feb-92	110	-237	737.43	735.1	682.7	673.4	718.28	717.51	Sep. 15.5.7	D
MW-24	The state of the s	06-Feb-92	83	-52	736.02	733.8	723.0	713.6	719.12	719.80	100	В
MW-25	WWES	20-Feb-92	-46	-215	736.21	733.8	676.2	666.8	718.14	717.35		D
MW-26	WWES	05-Feb-92	585	-283	736.39	734.0	716.1	706.6	720.31	721.57		В

ATEC-ATEC Associates, Indianapolis, IN

IT-IT Corporation, Pittsburgh, PA

WWES-WW Engineering & Science, Bloomington, IN

NA-data not available

D-decommissioned

U-not used in the RFI

Page 1

Location		GWIT-1AL	GWIT-2	GWIT-3 894301	MW-03	MW-09	MW-12	MW-20	MINEN DUT	
Sample Identification:		894311 03/05/92	894313	894301	892911	10028021	89/2002	102/201/	1802800	18028001
Sample Date:	The state of the last of the l	× 03/05/92	© U3/U3/92#¶	图 03/03/92開稿	03/02/92/蒙	U3/U3/92-0	* U3/U2/92	03/03/9269	# USIUSI 9/2## !	NOTO TO THE PARTY OF THE PARTY
Volatiles	Units	10 U	10 U	10 U	10 U	10 U	<500	10 U	10 U	10 U
Chloromethane	ug/L	10 U	10 U	10 U	10 U	10 U	<500	10 U	10 U	10 U
Bromomethane	ug/L		10 U	10 U	10 U	10 U	<500	10 U	10 U	10 U
Vinyl chloride 🖟 ·	ug/L	10 U	10 U	10 U	10 U	10 U	<500	10 U	10 U	10 U
Chloroethane	ug/L	10 U		5 U	5 U	5 U	<250	5 U	5 U	5 U
Methylene chloride	ug/L	5 U	5 U			71	<500	10 U	10 U	10 U
Acetone	ug/L	8 J	11	10 U	10 U	The same of the sa		5 U	5 U	5 U
Carbon disulfide	ug/L	5 U	5 U	5 U	5 U	5 U	<250	The same of the sa	5 U	5 U
1,1-Dichloroethylene	ug/L	5 U	5 Ų	5 U	5 U	5 U	<250	5 U		
1,1-Dichloroethane	ug/L	5 U	41	41)	5 U	5 U	103 J	5 U	5 U	5 U
trans-1,2-Dichloroethylene	ug/L						<250			
Chloroform	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
1,2-Dichloroethane	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
Methyl ethyl ketone	ug/L	10 U	10 U	10 U	10 U	10 U	<500	10 U	10 U	10 U
1,1,1-Trichloroethane	ug/L	5 U	25	(83)	4 J	9	2041	5 U	0.8 J	5 U
Carbon tetrachloride	ug/L	5 U	5 U	5 U	5 U	. 5 U	<250	5U	5 U	5 U
Vinyl acetate	ug/L						<500			
Dichlorobromomethane	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
1,1,2,2-Tetrachloroethane	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
1,2-Dichloropropane	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
trans-1,3-Dichloropropene	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
Trichloroethylene	ug/L	5 U	18	34)	81	2 J	2641	5 U	14	15
Dibromochloromethane	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
1,1,2-Trichloroethane	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
Benzene	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
cis-1,3-Dichloropropene	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
2-Chloroethylvinyl ether	ug/L	30					<500			
Bromoform	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
	ug/L	The state of the second	10 U	10 U	10 U	10 U	<500	10 U	10 U	10 U
2-Hexanone	ug/L	10 U	10 U	10 U	10 U	10 U	<500	10 U	10 U	10 U
Methyl isobutyl keytone			5 U	50	160	5 U	3471	5 U	58	59
Tetrachloroethylene	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
Toluene	ug/L	30	30	1 30	30	30	7230			



Location Sample Identification: Sample Date:		GWIT-1A 89431.1	(C)W(U.52.	( <b>6)</b> (/(11/6) (3)((£(0))	MAWEDS SOMETH	3MW409 892803	1MW419 892000	3MW#20 894800	3MW-21Din 894808	100 STO
Sample Date:		03/05/92	03/05/92	03/05/92	03/02/92	03/05/92	03/02/92	<b>203/05/92</b>	03/05/92	03/05/5/2
Volatiles	Units						22.00			
Chlorobenzene	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
Ethylbenzene	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
Styrene	ug/L	5 U	5 U	5 U	5 U	5 U	<250	5 U	5 U	5 U
Xylene	ug/L	5 U	5 U	5 U	. 5 U	5 U	<250	5 U	5 U	5 U
Acrolein	ug/L						<2500			
Iodomethane	ug/L		las sand	ed App	14		<250			
3-Chloropropene	ug/L		chair		14 VOCS		<250			
Chloroprene	ug/L				,,,,		<250			
trans-1,4-Dichloro-2-butene	ug/L			de la companya de la	and the second		<250		and the same	
Pentachloroethane	ug/L						<250			
Acetonitrile	ug/L						<5000			
Acrylonitrile	ug/L					Section 19	<2500			
Penta CDF	ug/L	SCHOOL SERVICE		Mary services	<del> </del>	Spirit mist	<500	and the same	Photo in the	en de la companya de
Methacrylonitrile	ug/L						<2500			
Isobutyl alcohol	ug/L						<5000			
1,4-Dioxane	ug/L						<25000			
Methyl methacrylate	ug/L						<250			
Pyridine	ug/L						<5000			
Ethyl methacrylate	ug/L						<250			
1.2-Dibromoethane	ug/L						<250			
1,1,1,2-Tetrachloroethane	ug/L						<250			
1,2,3-Trichloropropane	ug/L						<250			721 318 20
Dichlorodifluoromethane	ug/L						<250			
Trichlorofluoromethane	ug/L	L WEST	18 W 19 C				<250			
Dibromomethane	ug/L						<500			
1,2-Dichloroethylene	ug/L	5 U	78	5 U	5 U	5 U		5 U	5 U	5 U

App It

1110 -	MW	2	2	-26
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Location: Sample Identification		MW-22 14	MW-23Dup 894302	MW-23 894303	MW-24 892909	1.X.(\?\$7.6 (3.97.6.0)	MW-2/6
Sample Date		03/02/92	03/05/92	03/05/92	03/02/92	03/11/92	03/05/97
Volatiles	Units						
Chloromethane	ug/L	<1000	10 U	10 U	10 U	10 U	10 U
Bromomethane	ug/L	<1000	10 U	10 U	10 U	10 U	10 U
Vinyl chloride	ug/L	<1000 }	10 U	10 U	10 U	10 U	10 U
Chloroethane	ug/L	<1000	10 U	10 U	10 U	10 U	10 U
Methylene chloride	ug/L	<500	5 U	5 U	2 J	5 U	5 U
Acetone	ug/L	<1000	10 U	10 U	10 U	10 U	10 U
Carbon disulfide	ug/L	<500	5 U	5 U	5 U	5 U	5 U
1,1-Dichloroethylene	ug/L	<500	5 U	5 U	5 U	5 U	5 U
1,1-Dichloroethane	ug/L	<500	5 U	5 U	5 U	5 U	5 U
trans-1,2-Dichloroethylene	ug/L	<500					
Chloroform	ug/L	<500	5 U	5 U	5 U	5 U	5 U
1.2-Dichloroethane	ug/L	<500	5 U	5 U	5 U	5 U	5 U
Methyl ethyl ketone	ug/L	<1000	10 U	10 U	10 U	10 U	10 U
1,1,1-Trichloroethane	ug/L	<500	5 U	5 U	44	5 U	(5)
Carbon tetrachloride	ug/L	<500	5 U	5 U	5 U	5 U	5 U
Vinyl acetate	ug/L	<1000					
Dichlorobromomethane	ug/L	<500	5 U	5 U	5 U	5 U	5 U
1,1,2,2-Tetrachloroethane	ug/L	<500	5 U	5 U	5 U	5 U	5 U
1,2-Dichloropropane	ug/L	<500	5 U	5 U	5 U	5 U	5 U
trans-1,3-Dichloropropene	ug/L	<500	5 U	5 U	5 U	5 U	5 U
Trichloroethylene	ug/L	3167	5	7	40	5 U	5 U
Dibromochloromethane ·	ug/L	<500	5 U	5 U	5 U	5 U	5 U
1,1,2-Trichloroethane	ug/L	<500	5 U	5 U	5 U	5 U	5 U
Benzene	ug/L	<500	5 U	5 U	5 U	5 U	5 U
cis-1,3-Dichloropropene	ug/L	<500	5 U	5 U	5 U	5 U	5 U
2-Chloroethylvinyl ether	ug/L	<1000	F F SAL.				
Bromoform	ug/L	<500	5 U	5 U	5 U	' 5 U	5 U
2-Hexanone	ug/L	<1000	10 U	10 U	10 U	10 U	10 U
Methyl isobutyl keytone	ug/L	<1000	10 U	10 U	10 U	10 U	10 U
Tetrachloroethylene	ug/L	16774	40	47	8	2 J	3 J
Toluene	ug/L	<500	5 U	5 U	1 J	5 U	5 U



Location Sample (dentification)		MW-22 892904	892 <b>(3</b> 02)	1MW-5/2	MW-24	1MW-25 89790)	1MW-97; 1302.837;
Sample Date			03/05/92		03/02/07	103/11/99	
Volatiles	Units						K. Shaakaninin .
Chlorobenzene	ug/L	<500	5 U	5 U	5 U	5 U	5 U
Ethylbenzene	ug/L	<500	5 U	5 U	5 U	5 U	5 U
Styrene	ug/L	<500	5 U	5 U	5 U	5 U	5 U
Xylene	ug/L	<500	5 U	5 U	5 U	5 U	5 U
Acrolein	ug/L	<5000					
Iodomethane	ug/L	<500					
3-Chloropropene	ug/L	<500					
Chloroprene	ug/L	<500					
trans-1,4-Dichloro-2-butene	ug/L	<500					
Pentachloroethane	ug/L	<500		1- 42 -		品牌 上海	
Acetonitrile	ug/L	<10000					
Acrylonitrile	ug/L	<5000					
Penta CDF	ug/L	<1000					
Methacrylonitrile	ug/L	<5000					100
Isobutyl alcohol	ug/L	<10000					
1,4-Dioxane	ug/L	<50000					
Methyl methacrylate	ug/L	<500	148				
Pyridine	ug/L	<10000					
Ethyl methacrylate	ug/L	<500					
1,2-Dibromoethane	ug/L	<500					
1,1,1,2-Tetrachloroethane	ug/L	<500					
1,2,3-Trichloropropane	ug/L	<500					
Dichlorodifluoromethane	ug/L	<500					
Trichlorofluoromethane	ug/L	<500	1.00				
Dibromomethane	ug/L	<1000			M. S. S.		
1,2-Dichloroethylene	ug/L		5 U	5 U	5 U	5 U	5 U

#### Footnotes:

U = Chemical not detected at specified detection limit.

J = Estimated value.

La principal de la companya della companya de la companya della co		GW-1103EB	MWAPA MANAGA MAN		MW 22Do
		- (05/02/62) - (05/02/62)		892904 03/02/92	
Semi-Volatiles	Units	川いいけんりと場面	機能リングとは、	Wild Col Ca of Edwings	Win OJI OZ JZ
Phenol	ug/L	<20	<20	<20	<20
Bis(2-chloroethyl)ether	ug/L	<20	<20	<20	<20
2-Chlorophenol	ug/L	<20	<20	<20	<20
1,3-Dichlorobenzene	ug/L	<20	<20	<20	<20
1,4-Dichlorobenzene	ug/L	<20	<20	<20	<20
Benzyl alcohol	ug/L	<20	<20	<20	<20
1,2-Dichlorobenzene	ug/L	<20	<20	<20	<20
o-Cresol	ug/L	<20	<20	<20	<20
Bis(2-chloroisopropyl)ether	ug/L	<20	<20	<20	<20
m,p-Cresol	ug/L	<20	<20	<20	<20
n-Nitrosodi-n-propylamine	ug/L	<20	<20	<20	<20
Hexachloroethane	ug/L	<20	<20	<20	<20
Nitrobenzene	ug/L	<20	<20	<20	<20
Isophorone .	ug/L	<20	<20	<20	<20
2-Nitrophenol	ug/L	<20	<20	<20	<20
2,4-Dimethylphenol	ug/L	<20	<20	<20	<20
Benzoic acid	ug/L	<100	<100	<100	<100
Bis(2-chloroethoxy)methane	ug/L	<20	<20	<20	<20
2,4-Dichlorophenol	ug/L	<20	<20	<20	<20
1,2,4-Trichlorobenzene	ug/L	<20	<20	<20 ·	<20
Naphthalene	ug/L	<20	<20	<20	<20
4-Chloroaniline	ug/L	<20	<20	<20	<20
Hexachloro-1,3-butadiene	ug/L	<20	<20	<20	<20
p-Chloro-m-cresol	ug/L	<20	<20	<20	<20
2-Methylnaphthalene	ug/L	<20	<20	<20	<20
Hexachlorocyclopentadiene	ug/L	<20	<20	<20	<20
2,4,6-Trichlorophenol	ug/L	<20	<20	<20	<20 .
2,4,5-Trichlorophenol	ug/L	<100	<100	<100	<100
2-Chloronaphthalene	ug/L	<20	<20	<20	<20
2-Nitroaniline	ug/L	<100	<100	<100	<100
Dimethyl phthalate	ug/L	<20	<20	<20	<20
Acenaphthylene	ug/L	<20	<20	<20	<20
3-Nitroaniline	ug/L	<100	<100	<100	<100
Acenaphthene	ug/L	<20	<20	<20	<20
2,4-Dinitrophenol	ug/L	<100	<100	<100	<100
4-Nitrophenol	ug/L	<100	<100	<100	<100
Dibenzofuran	ug/L	<20	<20	<20	<20
2,4-Dinitrotoluene	ug/L	<20	<20	<20	<20
2,6-Dinitrotoluene	ug/L	<20	<20	<20	<20
Diethyl phthalate	ug/L	<20	<20	<20	<20
4-Chlorodiphenyl ether	ug/L	<20	<20	<20	<20
Fluorene	ug/L	<20	<20	<20	<20
4-Nitroaniline	ug/L	<100	<100	<100	<100

		(C)\Y2(0EIEC)		4	NAME AND THE	
Sample to a market to a 2. Sample Date:		692901 03/03/62	137/2012	03/02/92	03/02/92	
Semi-Volatiles	Units	TOTAL COLONIAL PROPERTY	AND THE PERSON	A briefly		
4,6-Dinitro-o-cresol	ug/L	<100	<100	<100	<100	
n-Nitrosodiphenylamine	ug/L	<20	<20	<20	<20	
4-Bromodiphenyl ether	ug/L	<20	<20	<20	<20	
Hexachlorobenzene	ug/L	<20	<20	<20	<20	
Pentachlorophenol	ug/L	<20	<20	<20	<20	
Phenanthrene	ug/L	<20	<20	<20	<20	
Anthracene	ug/L	<20	<20	<20	<20	
Di-n-butyl phthalate	ug/L	<20	<20	<20	<20	
Fluoranthene	ug/L	<20	<20	<20	<20	
Pyrene	ug/L	<20	<20	<20	<20	
Butyl benzyl phthalate	ug/L	<20	<20	<20	<20	
3,3'-Dichlorobenzidine	ug/L	<40	<40	<40	<40	
Benzo(a)anthracene	ug/L	<20	<20	<20	<20	
Bis(2-ethyl hexyl)phthalate	ug/L	<20	<20	<20	<20 .	
Chrysene	ug/L	<20	<20	<20	<20	
Di-n-octyl phthalate	ug/L	<20	<20	<20	<20	
Benzo(b)fluoranthene	ug/L	<20	<20	<20	<20	
Benzo(k)fluoranthene	ug/L	<20	<20	<20	<20	
Benzo(a)pyrene	ug/L	<20	<20	<20	<20	
Indeno(1,2,3-cd)pyrene	ug/L	<20	<20	<20	<20	
Dibenz(a,h)anthracene	ug/L	<20	<20	<20	<20	
Benzo(ghi)perylene	ug/L	<20	<20	<20	<20	
Parathion	ug/L	<40	<40	<40	<40	
Ethyl methanesulfonate	ug/L	<20	<20	<20	<20	
p-Phenylenediamine	ug/L	<20	<20	<20	<20	
n-Nitrosodiethylamine	ug/L	<20	<20	<20	<20	
n-Nitrosomethylethylamine	ug/L	<20	<20	<20	<20	
n-Nitrosodi-n-butylamine	ug/L	<20	<20	<20	<20	
n-Nitrosopiperidine	ug/L	<20	<20	<20	<20	
5-Nitro-o-toluidine	ug/L	<20	<20	<20	<20	
4-Dimethylaminoazobenzene	ug/L	<20	<20	<20	<20	
Methyl parathion	ug/L	< 0.03	<0.033	<0.03	<0.03	
Safrole	ug/L	<40	<40	<40	<40	
Isosafrole	ug/L	<40	<40	<40	<40	
2-Picoline	ug/L	<20	<20	<20	<20	
Phenacetin	ug/L	<20	<20	<20	<20	
2-Toluidine	ug/L	<20	<20	<20	<20	
3,3'-Dimethylbenzidine	ug/L	<100	<100	<100	<100	
m-Dinitrobenzene	ug/L	<20	<20	<20	<20	
a.a-Dimethylphenthylamine	ug/L	<20	<20	<20	<20	
O,O,O-Triethyl phosphorothioate	ug/L	<20	<20	<20	<20	
Methapyrilene	ug/L	<40	<40	<40	<40	
Diallate	ug/L	<40	<40	<40	<40	

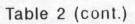


		GW/4103BB			MW-22Day
Simple Chiles Constitution		8929011	892902 03/02/92	892904	
Sampio Date 1855	Units	103/04/92 mg	開門 ひろび は タンス 東京	W U31U232	USIUZIJZ
1,3,5-Trinitrobenzene	ug/L	<200	<200	<200	<200
Famphur	ug/L	<20	<20	<20	<20
4-Nitroquinoline-1-oxide	ug/L	<200	<200	<200	<200
1,2,4,5-Tetrachlorobenzene	ug/L	<20	<20	<20	<20
Pentachloronitrobenzene	ug/L	<20	<20	<20	<20
Phorate	ug/L	<0.15	<0.16	<0.15	<0.15
7,12-Dimethylbenz(a)anthracene	ug/L	<20	<20	<20	<20
n-Nitrosodimethylamine	ug/L	<20	<20	<20	<20
2,4,5,6-Tetrachlorophenol	ug/L	<20	<20	<20	<20
Chlorobenzilate	ug/L	<20	<20	<20	<20
Thionazin	ug/L	<40	<40	<40	<40
Disulfoton	ug/L	<0.2	<0.22	<0.2	<0.2
Isodrin	ug/L	<200	<200	<200	<200
n-Nitrosomorpholine	ug/L	<20	<20	<20	<20
Pentachlorobenzene	ug/L	<20	<20	<20	<20
4-Aminobiphenyl	ug/L	<20	<20	<20	<20
Hexachloropropene	ug/L	<20	<20	<20	<20
2,6-Dichlorophenol	ug/L	<20	<20	<20	<20
Sulfotepp	ug/L	<20	<20	<20	<20
Methyl methanesulfonate	ug/L	<20	<20	<20	<20
1,4-Naphthoquinone	ug/L	<20	<20	<20	<20
n-Nitrosopyrrolidine	ug/L	<20	<20	<20	<20
Acetophenone	ug/L	<20	<20	<20	<20
Dimethoate	ug/L	<20	<20	<20	<20
3-Methylcholanthrene	ug/L	<20	<20	<20	<20
2-Acetylaminofluorene	ug/L	. <20	<20	<20	<20
Aniline	ug/L	<100	<100	<100	<100
1,2-Dibromo-3-chloropropane	ug/L	<20	<20	<20	<20
Hexachlorophene	ug/L	<20	<20	<20	<20
Kepone	ug/L	<100	<100	<100	<100
1-Naphthylamine	ug/L	<20	<20	<20	<20
2-Naphthylamine	ug/L	<20	<20	<20	<20
Pronamide	ug/L	<100	<100	<100	<100
Aramite.	ug/L	<200	<200	<200	<200

L'OCALION DE LA CALLES		GW-103EB	MW-121	MW-22	District with the standard of
Sample Identification: Sample Date:				892904 03/02/92	
Pesticides	Units	:期間・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・	milini, OSI OZI SZ, anjesa		03/02/2
Azinphos-methyl	ug/L	<1.5	<1.6	<1.5	<1.5
Bolstar	ug/L	<0.15	<0.16	<0.15	<0.15
Chlorpyrifos	ug/L	<0.3	<0.33	<0.3	<0.3
Coumaphos	ug/L	<1.5	<1.6	<1.5	<1.5
Demeton-S	ug/L	<0.25	<0.27	<0.25	<0.25
Diazinon	ug/L	<0.6	<0.66	<0.6	<0.6
Dichloryos	ug/L	<0.1	<0.11	<0.1	<0.1
Disulfoton	ug/L	<0.2	<0.22	<0.2	<0.2
Ethoprop	ug/L	<0.25	<0.27	< 0.25	<0.25
Fensulfothion	ug/L	<1.5	<1.6	<1.5	<1.5
Fenthion	ug/L	<0.1	<0.11	<0.1	<0.1
Merphos	ug/L	<0.25	<0.27	< 0.25	<0.25
Mevinphos	ug/L	<0.3	<0.33	<0.3	<0.3
Naled	ug/L	<0.1	<0.11	<0.1	<0.1
Methyl parathion	ug/L	<0.03	< 0.033	< 0.03	<0.03
Malathion	ug/L	<0.5	<0.55	<0.5	<0.5
Phorate	ug/L	<0.15	<0.16	< 0.15	<0.15
Ronnel	ug/L	<0.3	<0.33	<0.3	<0.3
Stirofos	ug/L	<5	<5.5	<5	<5
PCB: aroclor 1016	ug/L	<1	<1	<1	<1 .
PCB: aroclor 1221	ug/L	<1	· <1	<1	<1
PCB: aroclor 1232	ug/L	<1	<1	<1	<1
PCB: aroclor 1242	ug/L	<1	<1	<1	<1
PCB: aroclor 1248	ug/L	<1	<1	<1	<1
PCB: aroclor 1254	ug/L	<2	<2	<2	<2
PCB: aroclor 1260	ug/L	2	<2	<2	<2
TCDD, total	ug/L	< 0.0031	<0.0006	<0.0018	<0.0014
Penta CDD, total	ug/L	< 0.0045	< 0.0007	< 0.0022	<0.0008
Hexa CDD, total	ug/L	< 0.0013	< 0.0028	< 0.0017	<0.0015
Hepta CDD, total	ug/L	<0.0058	<0.003	< 0.0025	<0.0029
Octa CDD, total	ug/L	< 0.0063	< 0.0079	< 0.0055	<0.0048
Tetra CDF, total	ug/L	<0.0006	< 0.0002	< 0.0014	<0.0015
Penta CDF, total	ug/L	<0.0018	< 0.0013	< 0.0014	<0.0004
Hexa CDF, total	ug/L	<0.0018	< 0.0006	<0.0012	< 0.0017
Hepta CDF, total	ug/L	<0.0021	<0.0008	< 0.0014	<0.0015
Octa CDF, total	ug/L	<0.0059	<0.0056	<0.0032	<0.0025
2,4-D	ug/L	<1.8	<1.8	<1.8	<1.8
2,4,5-T	ug/L	<0.3	<0.3	<0.3	<0.3
Silvex (2,4,5-TP)	ug/L	<0.3	<0.3	<0.3	<0.3
2-sec-Butyl-4,6-dinitro-phenol	ug/L	<0.3	<0.3	<0.3	<0.3



Location:	9 1	GWITLIA 8943111	GWITHIA ESSOU	GWIT-2 894318	GWIT-2 896001	GWIT-3 894301	MW-03 892911	894304	MW-12 892902	MW-12Dis 892903	894307	MW-21Dop 894308
Sample Date:		03/05/92	03/06/92	03/05/92	03/06/92	03/05/92	03/02/92	03/05/92	03/02/92	03/02/92	03/05/92	03/05/92
Inorganics	Units					/	1000	0610	. 1		5710	101 B
Aluminum	ug/L	484		6020		11000 /	4860	8610 <sub>V</sub>		-60	17 UN	17 UN
Antimony	ug/L	17 UN		17 UN		17 UN	17 U	17 UN	<60 3	<60 <10	6 UN	6 UN
Arsenic	ug/L	(17N)V		6 UN		6 UNWM	3.3 B	6 UN	<10	TO A PARTITION OF THE PER	380	528
Barium	ug/L	114 B	A	694 /		423	269	270	559 \	101	1.1 B	1 U
Beryllium	ug/L	1 U		1.1 B		1.8 B	1 U	1.4 B	<5	<5	2 U	2 U
Cadmium	ug/L	2 U		2 U		2 U	2 U	2 U	<5	ঠ	S. A. C. Waller of the Control of th	1170000/
Calcium	ug/L	63000		394000		567000	340000	525000			612000	1
Chromium	ug/L	4 U		16.9		32.8	15.6	27 /	24.7	ර	20.1	87.3
Cobalt	ug/L	4 U		15.3 B 🗸		34.4 B	8 B	15.6 B /	80.4	<10	12.5 B	11 B
Copper	ug/L	6 U		76.7 /		94.9 /	90.6/	72.7	160 √	<10	67.4	18.1 B
Iron	ug/L	2920		21200		28400	8790	16700	7./	9.08	13200	407 4.6 *
Lead	ug/L	2.7 B*		41.7 S*		79 * √	29.5 S	58.5 */	623.4	9.08	40.8 *	Victor and American
Magnesium	ug/L	30800		123000		187000	65700	158000			232000	323000
Manganese	ug/L	202		1730		2800	982	1030			2840	2440
Mercury	ug/L	0.2 U		0.2		0.3	0.26	0.38	0.49	<0.2	0.34	0.45
Nickel	ug/L	11.3 B		50.1		64.6	58.8 /	47.6	118 /	<10	40.9	122 🗸
Potassium	ug/L	1830 B	7	3610 B		3510 B	3540 B	3840 B	/		4590 B	3520 B
Selenium	ug/L	3 U		3 U		5.3 V	3.4 B	4.3 B	7.75	45	3 U	25.9 SM
Silver	ug/L	2 U		2 U		2 U	12.1	2 U	<10	<10	2 U	2 U
Sodium	ug/L	34800		20900	SEA TO	7390	8790	9530			10300	7530_
Sulfide, total	ug/L									to the same of		Section 1
Thallium	ug/L	2 UN		2 UN		2 UN	2 U	2 UN	<10	<10	2 UN	2 UN
Tin	ug/L								<50 .	511		
Vanadium ?	ug/L	4 U		23 B		36.9 B V	20 B	42.1 B	28.9	<10	35.4 B	89
Zinc	ug/L	9.2 BE		110 E		177 E	94.4 E	198 E	345	11.9	1080 E	5.3 BE
Cyanide	ug/L					10 U	10 U	10 U	?	4	10 U	10 U
Cyanide, amenable	ug/L		<10		<10	<10	<10	<10	1	,	<10	<10



cocations Sample Identification Sample Date:		MW-21 894309 03/05/92	896003	892904	892905	MW-22Diip 1392906 03/02/92	黨 894302 個	894303	第892909 章	图 897901 日本	MW#26 8948192 03/05/922	1MW226 9328001 (041166924
Inorganics	Units							/			6000	
Aluminum	ug/L	8500					14700 /	15800 /	15600 /	700	6020 17 UN	
Antimony	ug/L	17 UN		<60	<60		17 UN	17 UN	17 U	16 U		
Arsenic	ug/L	6 UN		<10	<10		7.4 BN	7.6 BN	4.4 B	6 U	6 UN	
Barium	ug/L	472 √	Later County of the County of	307	82.4		473	500	505	64.2 B	223	
Beryllium	ug/L	2.6 B	美工 分别的	<5	<5		1.9 B	2.1 B	2.3 B	1 U	1 U	
Cadmium	ug/L	2.5 B		<5	<5		2 U	2 U	2 U	2 U	2 U	
Calcium	ug/L	1000000					169000	193000	774000	60000	345000	
Chromium 100+	ug/L	58.5		36.5 /	<5		25.6	28.4	37.1	3 U	23.2 √	
Cobalt	ug/L	75		34.3	<10		11.8 B	13.6 B	23.1 B	6 U	11 B	
Copper	ug/L	510		234	<10		121	130	142	4 U	47.4	
Iron	ug/L	7670					23100	26000	18100	1220	16900	
Lead	ug/L	162 *		68.42	<3		95.7 *	69.3 *	89.4 W	4.3 W	32.4 S*	
Magnesium	ug/L	342000					63200	73300	178000	26600	114000	
Manganese	ug/L	3520					2900	3250	2170	357	1020	
Mercury	ug/L	0.35		0.26	<0.2		0.2 U	0.2 U	0.67	0.2 U	0.23	
Nickel	ug/L	538		92.9	<10		34.6 B	41.7/	65.2	8 U	43.4	
Potassium	ug/L	3570 B					2880 B	2870 B	5530 \	2250 B	7010	100 m
Selenium	ug/L	7.5 1		5	<5		3 U	3 U	4.9 BS	2 U	3 UW	
Silver	ug/L	46.7		62.2	<10		2 U	2 U	2 U	1 U	2 U	Br. B
Sodium	ug/L	6530					30900	31200	5840	25700	10000	
Sulfide, total	ug/L				P-100 124	<1000		All Marie	T SOLDIES			
Thallium	ug/L	2 UN		<10	<10		2 UN	2 UN	2 U	2 U	2 UN	
Tin	ug/L			<50	<50				Pro Ass			
Vanadium	ug/L	63.8		70.5	<10		35.7 B	37 B	53.8	6 U	22.7 B	
Zinc	ug/L	256 E		236	<10		234 E	261 E	224 E	17.2 B	89.9 E	No. of the last
Cyanide	ug/L						10 U	10 U	10 U	10 U		
Cyanide, amenable	ug/L		<10		1 × 20 10		<10	<10	<10	<10	2000年	<10

#### Footnotes:

- U = Chemical not detected at specified detection limit.
- \* = Duplicate analysis was not within control limits.
- B = Reported value is below Contract Required Detection Limit (DL) but above instrument DL.
- E = Value is estimated due to matrix spike interferences.
- M = Duplicate injection precision criteria not met.
- N = Spiked sample recovery not within control limits.
- S = Reported value was determined by the Method of Standard Additions (MSA).
- W = Post-digestion spike for furnace AA analysis is out of control limits, while sample absorbance is <50% of spike absorbance.

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